Technical information for private, trunked and public safety networks

MRT

MOBILE RADIO TECHNOLOGY®

WWW.MRTMAG.COM

JUNE 2002

20 Our 20th year of technology

Pentagon attack

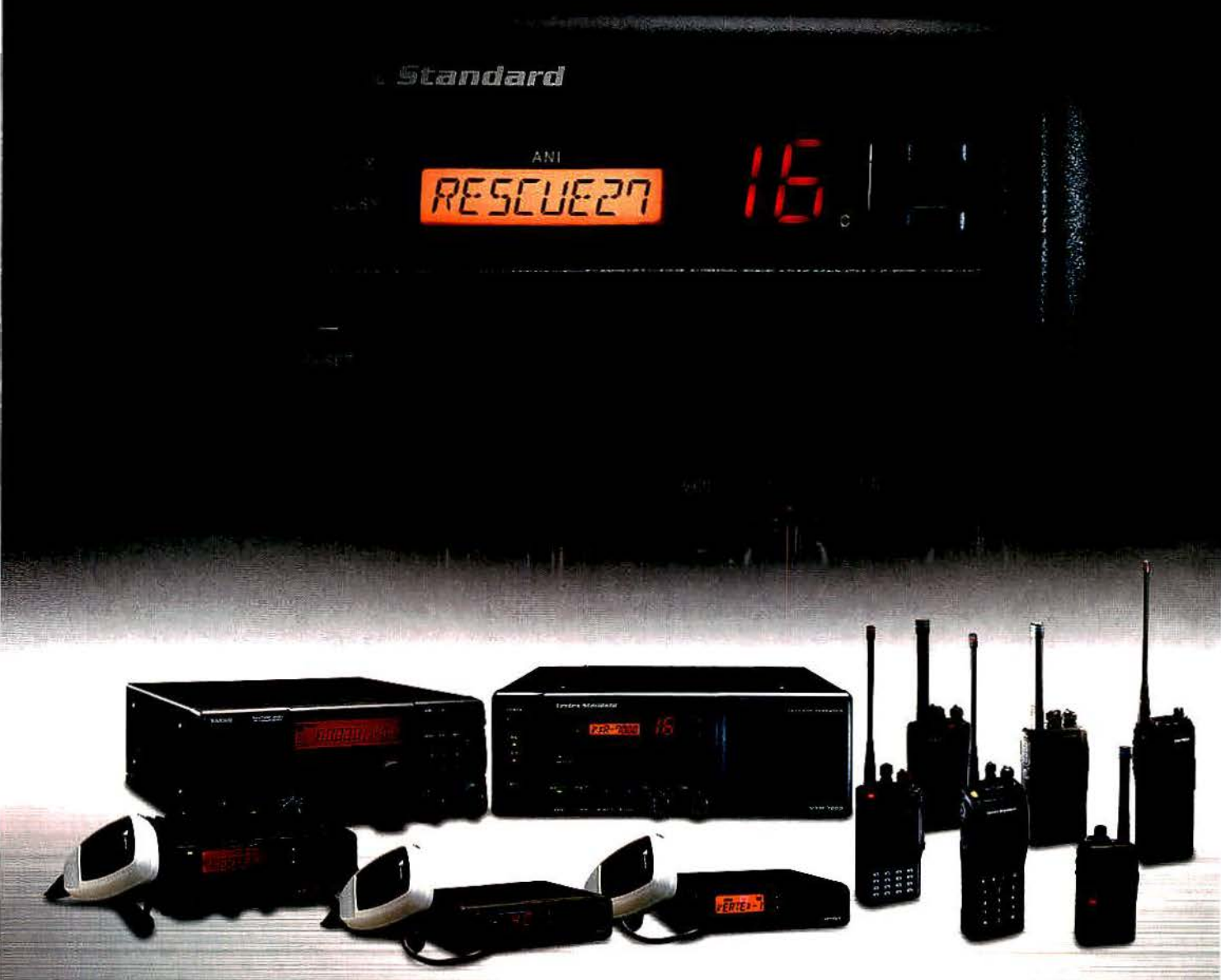
How interoperability proved itself

Software-defined radio
The multipurpose two-way radio

Scanners vs. scramblers
Is eavesdropping on public safety radio a right?

A PRIMEDIA Publication

WE MAKE A DIFFERENCE IN CRITICAL COMMUNICATIONS
VERTEX STANDARD
DESIGNED FOR PUBLIC SAFETY PROFESSIONALS



Vertex Standard
We make a difference

US Headquarters
17210 Edwards Rd., Cerritos, CA 90703, U.S.A.
Phone 562/404-2700; Fax 562/404-1210
International Division
8350 N.W. 52nd Terrace, Suite 201, Miami, FL 33166 U.S.A.
For more information,call 562-404-2700. Or visit www.vxstd.com

ISO9002
Sukagawa Factory
Vertex Standard Co.,Ltd.
ISO9002 certification

CIRCLE (1) ON FAST FACT CARD

In the world of Wireless Networks M/A-COM delivers the best in private radio solutions.

EDACS®

OpenSky®

NetworkFirst

Total communications solutions. Interoperability. Serving public safety, utility, industrial, commercial, and government organizations worldwide.

tyco Electronics

M/A-COM

CIRCLE (4) ON FAST FACT CARD

www.macom.com

On the cover: *Photo courtesy of FEMA.*

MRT®
MOBILE RADIO TECHNOLOGY

JUNE 2002
Volume 20, Issue 6

Features

8 **Cover Story: Interoperability: It's about saving lives**
James Careless
When a hijacked plane hit the Pentagon on Sept. 11, interoperability helped public safety agencies respond quickly. This incident is just one example of how successful radio communications can save costs, resources and lives.

14 **Demystifying software radio**
Stephen Bartlett
Looking for a 'magic bullet' two-way radio that covers all frequency bands, all channel bandwidths, all modulation techniques and all control and signaling protocols? Look no more—it's *software-defined radio*.

22 **Product/logo directory**
Consult this list of leading telecommunications service and equipment providers.

ON THE WEB AT WWW.MRTMAG.COM:

Virginia county gives Motorola disputed 800MHz contract
Fauquier County has approved a $7.2 million contract for a new Motorola 800MHz Astro digital trunked wireless communications system.

AT&T Wireless responds to UCAN interference complaint
AT&T Wireless appears to be ready to take steps that may mitigate radio interference reported by the Utah Communications Agency Network in Sandy, UT.

Departments

4 **In sync**
Don Bishop
Scanners vs. scramblers

26 **Tuning in**
Nextel's international unit files for bankruptcy protection

28 **20/20 Visions**
Peter Brake
Bigger is not always better

30 **Product focus:**
Grounding equipment

32 **Products**
Product Encore:
Base antennas

33 **Classified**

40 **Pack Your Suitcase**

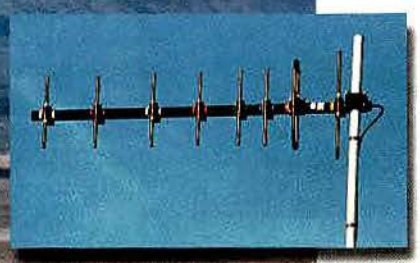
40 **Ad index**

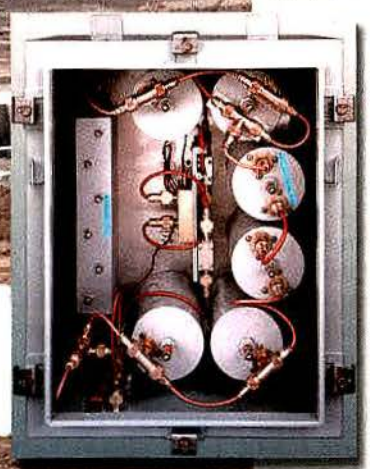
Arlington, VA, Sept. 12, 2001: Exterior of the crash site following the attack on the Pentagon. *Photo by Jocelyn Augustino/ FEMA News Photo.*

***Mobile Radio Technology*, Volume 20, Issue 6**, ISSN 0745-7626 is published monthly by PRIMEDIA Business Magazines & Media Inc., 9800 Metcalf Ave., Overland Park, KS 66212 (**primediabusiness.com**). Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canada Post Publication Mail (Canadian Distribution) Sales Agreement No. 0956309. Current and back issues and additional resources, including subscription request forms and an editorial calendar, are available on the Web at **www.mrtmag.com.**
SUBSCRIPTIONS: *Mobile Radio Technology* is mailed free to qualified subscribers within the United States and Canada. Non-qualified subscribers may subscribe at the following rates: United States: one-year: $35; Canada: one-year: $45. Qualified and non-qualified subscribers in all other countries: one-year: $45 (surface mail); $90 (air mail). Subscription information: P.O. Box 12960, Overland Park, KS 66282-2960.
POSTMASTER: Send address changes to *Mobile Radio Technology*, P.O. Box 12960, Overland Park, KS 66282-2960.

"COMING THROUGH LOUD AND CLEAR ..."

- Antennas
- Combiners
- Wattmeters
- Duplexers
- Filters
- System Design





FORMER WACOM CUSTOMERS:

Telewave can support Wacom commercial and amateur products. Many Telewave products share a common design heritage with Wacom, and most of our cavity and isolator products are drop-in replacements for Wacom. We can repair, rebuild, and expand most existing Wacom items or systems without a complete change-out.

Telewave, Inc. delivers high performance ... everywhere, everytime.

We bring 30 years of product engineering and system design expertise to the table for every customer, large or small.

With a full line of standard products, and the ability to quickly create custom designs for special projects, Telewave provides unmatched support for Public Safety, Government, and Business radio systems.

Call us today at 1-800-331-3396, and discuss your requirements with our expert sales engineers, or visit us at www.telewave.com

Telewave, Inc.
660 Giguere Court
San Jose, CA 95133

Wacom is a registered trademark of Wacom Co., Ltd.

TELEWAVE, INC.

Radio System Manufacturer since 1972

CIRCLE (5) ON FAST FACT CARD

Scanner users vs. scramblers

What's more important: the safety of police officers, firefighters and emergency medical service crew members or the ability for people to listen to their radio communications?

Put it that way, and the answer seems simple. But listening to radio communications may involve important rights, such as free exchange of public information on the Internet and the use of radio receivers.

We've heard from a few readers who like to exchange frequency lists and monitor public safety communications. Some have interpreted the advertising of information security devices (scramblers) as tossing listeners into a category with criminals and terrorists.

They were reacting to an advertisement in last month's issue that pictured a young man viewing a computer display of radio frequencies and that showed a firefighter with a two-way radio. The ad copy suggested that the use of scramblers might improve homeland security.

The advertisement alarmed some scanner hobbyists.

'In the clear'

Let's make our position plain:

The use of receivers to listen to any radio signal that contains information transmitted "in the clear" (not scrambled or encrypted) should be unrestricted. That was our position before the passage of the 1986 Electronic Privacy Act, and that's our position now. The Act placed more restrictions on receiver use in the United States than a free society should have. It's wrong, but it's the law.

The Communications Act's restriction on the *use* of information heard by unintended listeners (such as those who monitor public safety communications and who, in an earlier age, could lawfully listen to common carrier transmissions) is sufficient.

Radio users who want to ensure the privacy of their communications should use scrambling or encryption to prevent it from being understood by unintended listeners. That notion not only flows from

our support of unrestricted receiver use, it recognizes that possible sanctions do little to deter someone using a receiver to further an unrelated criminal act.

For example, if a bank robber is undeterred by a possible prison sentence of 20 years to life, he won't worry about a possible fine for using a receiver to listen to the bank's security service frequencies.

Here's another thing: No reasonable person would begrudge a public safety agency's use of scrambling or encryption to protect their people during tactical operations.

For example, police officers, firefighters and emergency medical service crew members responding to emergencies involving hostages, snipers, armed assailants and a variety of other volatile circumstances can be well-served by scrambled or encrypted radio communications that cannot be understood by criminals, reporters and the public.

Meanwhile, the public can be well-served when public safety communications involving fires and vehicle collisions can be monitored and reported for the benefit of commuters. Maybe you know of other examples when members of the public have rendered aid as a result of something heard on receivers.

Free speech; no censorship

Now, about advertising in general: Most advertising is protected free speech. We would no more censor an advertiser's message than we would censor a guest editorial or a letter to the editor that takes a position contrary to ours.

And about the particular advertisement in question: A frequency-searching computer user *can* compromise the security of public safety workers, including firefighters. Such a user might be a stringer for a newsgathering organization, might otherwise pass the information along in such way that it falls into mischievous hands, or might himself be someone with a harmful purpose. A firefighter responding to an emergency is entitled to as much protection as possible. Under some conditions, that protection should extend to communications.

Protecting public safety workers shouldn't involve restrictions on receiver or computer use, but it may well involve scrambling or encryption. The advertisement was placed to sell a product, but it also did a service in reminding public safety agencies that radio transmissions made "in the clear" may, at just the wrong time, be heard by a listener who might misuse what he hears in a way that—intentionally or not—places lives, health or property at risk.

Don Bishop

Editorial Director
dbishop@primediabusiness.com

ICOM. . . FOR PEOPLE WHO MAKE SMART CHOICES

QUALITY ASSURED FIRM ISO 9001 SGS

FM APPROVED

People the world over know and trust ICOM radios. With a 30 + year reputation for rugged construction, innovation and high performance, you can count on ICOM.

SNAP FLASH TRUNKING

ICOM portables are the professional choice.
Built so rugged, the U.S. Army selected ICOM portables for exclusive use as its Soldier Intercom battlefield radio. For the latest technology, advanced features and outstanding value, ICOM is the smart alternative.

ICOM mobiles – from the basic IC-F320S/F420S to the advanced **NEW** IC-F520/F620 series, ICOM's MIL SPEC radios are built to meet the most demanding operational specifications.*

Whatever your communication needs, trust the fastest growing land mobile radio company. Trust ICOM. For information about becoming an ICOM dealer, call 425-454-8155. To find out more about ICOM radios, please visit your authorized ICOM dealer, call 425-450-6088 for free brochures, or visit our Website: www.icomamerica.com

ICOM®

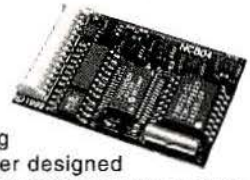
*MIL SPEC 810 C/D/E ©2002 ICOM America, Inc. • 425-454-8155
The ICOM logo is a registered trademark of ICOM, Inc. FAMMRT502

CIRCLE (6) ON FAST FACT CARD

VOICE Plus ENCRYPTION SCRAMBLER

MODEL NC804

$129.95
(1-9 pcs.)



The Model NC804 is a micro-miniature voice-plus pseudo-random rolling code scrambler designed to provide high level security for two-way radio voice communiction systems. It's unique digital encryption processing algorithm, plus it's many features makes the Model NC804 a perfect cost effective solution for high-end voice encryption scrambling for commercial users, police departments, public safety organizations and other systems as a defense against unauthorized interception of private and sensitive voice transmissions by casual or even the most determined listeners. The Model NC804 features 8 user code keys with over 20 trillion codes to choose from. Kill disable for stolen or lost radios, over the air programming for changing of units operating parameters without removal from radio. Measuring .90" W x 1.30"L x .22"H, the Model NC804 supports limited space applications and is plug compatible with our popular Model NC802 voice inversion scrambler making it ideal for system upgrades.

- OVER THE AIR PROGRAMMING
- SCRAMBLE/CLEAR MODES
- AUDIBLE ANNOUNCER
- VISUAL INDICATOR
- INTERFACING
- SYNCHRONIZATION
- CODE KEY MEMORIES
- SYSTEM PROGRAMMING
- VOICE QUALITY • COS MODE
- KEY CODES • KILL FUNCTION

For Detailed Specifications or Product Catalog contact us by Email: info@norcommcorp.com or our website: www.norcommcorp.com

NORCOMM™
DATA SIGNALLING PRODUCTS

530-477-8400
800-874-8663
15385 Carrie Dr., Grass Valley, CA 95949 USA

CIRCLE (7) ON FAST FACT CARD

A PRIMEDIA Publication

MRT
MOBILE RADIO TECHNOLOGY®

Editorial Director—Don Bishop, *dbishop@primediabusiness.com*
Editor—Roger Lesser, *rlesser@primediabusiness.com*
Managing Editor—Nikki Chandler, *nchandler@primediabusiness.com*
Associate Editor—Megan Alderton, *malderton@primediabusiness.com*
Senior Art Director—Maurice Lydick, *mlydick@primediabusiness.com*
Art Director—Jani Duncan, *jduncan@primediabusiness.com*
Contributing Editor—Harold Kinley, C.E.T., *halkinley@charter.net*
Contributing Editor—Donald E. Koehler, *AFDEKI@uaa.Alaska.edu*
Contributing Editor—Patrick Buller, *W7rqt@msn.com*
Contributing Editor—Ernest Worthman, *eworthman@primediabusiness.com*
Public Safety Consultant—David O. Dunford, *Lenexa, KS, Police Department*
Regulatory Consultant—Robert H. Schwaninger Jr., *Schwaninger & Associates, Washington, DC*
Editorial Advisory Board—John Abbey, *The Abbey Group*; Elliott Hamilton, *Wireless IT Research Group*; Richard P. Biby, *P.E., SiteSafe*; Alan Burton, founder, *Dispatch Monthly magazine*; Gene A. Buzzi, *Tallahassee, FL*; Jack Daniel, *The Jack Daniel Company*; Gary David Gray, P.E., *Orange County Communications*; Frederick G. Griffin, P.E., *Frederick G. Griffin P.C.*; Jim Hendershot, *Radio Design Group*; Samuel J. Klein, *Technical Associates LLC*; S.R. McConoughey, P.E., *Mobile Communications Consulting*; Art McDole, *Salinas, CA*; Tony Sabino, *Regional Communications*; Robert C. Shapiro, P.E., *Strategic Telecommunications*; Leon Spencer, *ExxonMobil Global Services*; Gregory M. Stone, Ph.D., *Quantum Radionics*; Tom Tolman, *National Law Enforcement and Corrections Technology Center*; Raymond C. Trott, P.E., *Trott Communications Group*; William A. Wickline, P.E., *Mentor, OH*.

Vice President—Larry Lannon, *llannon@primediabusiness.com*
Publisher—Mercy Contreras, *mcontreras@primediabusiness.com*
Advertising Sales Manager—Joyce Bollegar, *jbollegar@primediabusiness.com*
Advertising Sales Manager—Jody Geist, *jgeist@primediabusiness.com*
International Sales—Stephen Bell, *stephenbell@email.msn.com*
Classified Sales—Dawn Rhoden, *drhoden@primediabusiness.com*
List Rental Services Representative—Scott Perrillo, *sperillo@statlistics.com*
Advertising Services Manager—Karen Clark, *kclark@primediabusiness.com*

Vice President, Production—Thomas Fogarty, *tfogarty@primediabusiness.com*
Production Manager—Melissa Langstaff, *mlangstaff@primediabusiness.com*
Ad Production Coordinator—Holly Hutchcraft, *hhutchcraft@primediabusiness.com*
Classified Ad Coordinator—Kristi Knupp, *kknupp@primediabusiness.com*

Vice President, Audience Marketing—Christine Oldenbrook, *coldrenbrook@primediabusiness.com*
Audience Marketing Director—Susi Cordill, *scordill@primediabusiness.com*
Audience Marketing Manager—Sonja Rader, *srader@primediabusiness.com*
Customer Service—800-441-0294

PRIMEDIA
Business Magazines & Media

Chief Executive Officer—Timothy M. Andrews, *tandrews@primediabusiness.com*
President—Ronald Wall, *rwall@primediabusiness.com*
Chief Operating Officer—Jack Condon, *jcondon@primediabusiness.com*
Sr. Vice President, Integrated Sales—Dave Lovinger, *dlovinger@primediabusiness.com*
Sr. Vice President, Business Development—Eric Jacobson, *ejacobson@primediabusiness.com*
Vice President, Content Licensing & Development—Andrew Elston, *aelston@primediabusiness.com*
Vice President, Corporate Communications/Marketing—Karen Garrison, *kgarrison@primediabusiness.com*
Vice President, Finance—Tom Flynn, *tflynn@primediabusiness.com*
Vice President, New Media—Andy Feldman, *afeldman@primediabusiness.com*
Vice President, Technology—Cindi Reding, *creding@primediabusiness.com*

PRIMEDIA Business-to-Business Group—745 Fifth Ave., NY, New York 10151
President & Chief Executive Officer—David Ferm, *dferm@primedia.com*
Chief Creative Officer—Craig Reiss, *creiss@primedia.com*
Creative Director—Alan Alpanian, *aalpanian@primediabusiness.com*

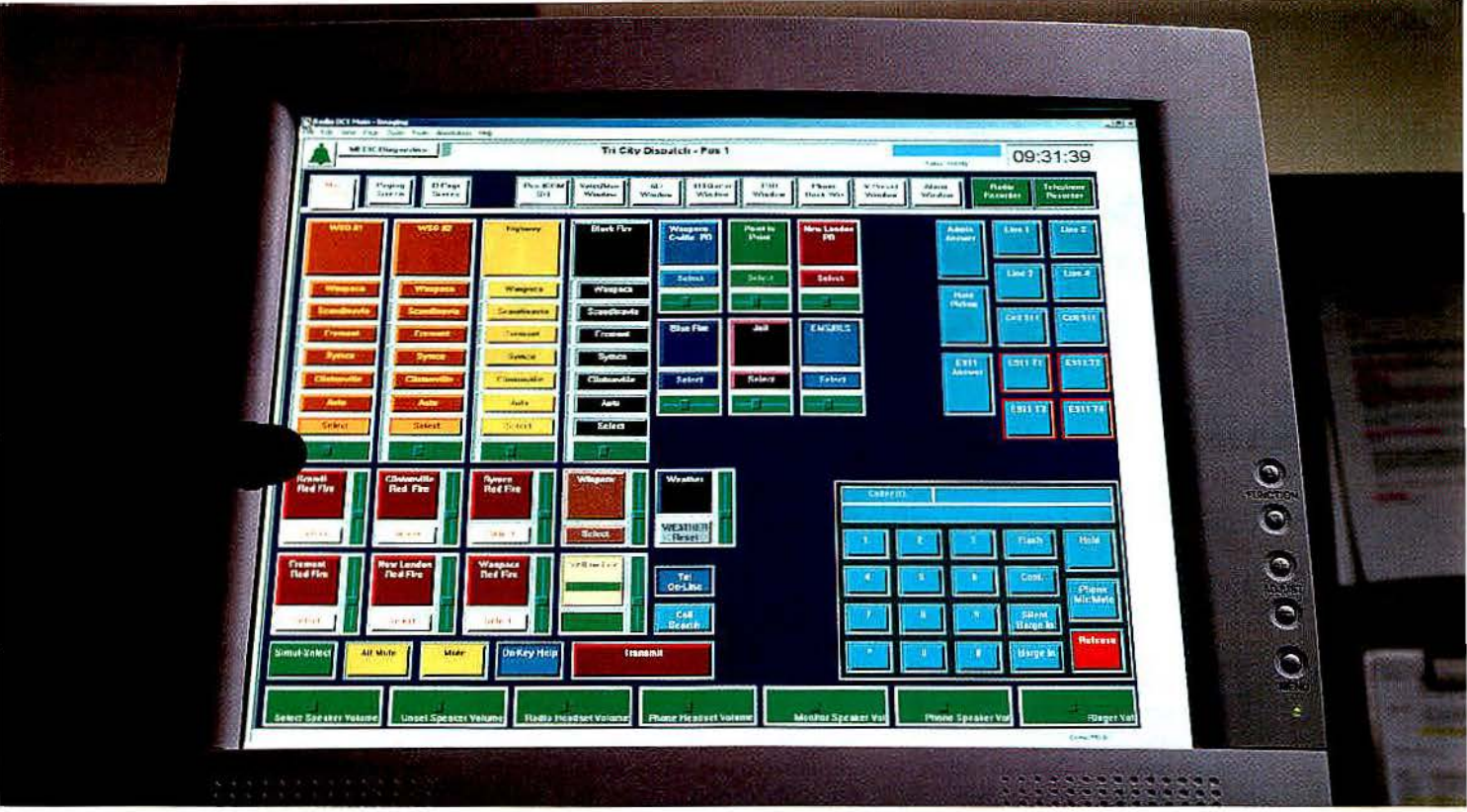
PRIMEDIA Inc.
Chairman & Chief Executive Officer—Tom Rogers, *trogers@primedia.com*
Vice Chairman & General Counsel—Beverly Chell, *bchell@primedia.com*
President—Charles McCurdy, *cmccurdy@primedia.com*

Member, American Business Media—Member, BPA International

ABM BPA Audited circulation.

REPRINTS: Contact FosteReprints to purchase quality custom reprints or e-prints of articles appearing in this publication at 866-436-8366 (219-879-8366 outside the U.S. and Canada). Instant reprints and permissions may be purchased directly from our Web site; look for the iCopyright tag appended to the end of each article.
PHOTOCOPIES: Authorization to photocopy articles for internal corporate, personal or instructional use may be obtained from Copyright Clearance Center (CCC) at 978-750-8400. Obtain further information at **copyright.com**.
ARCHIVES & MICROFILM: This magazine is available for research and retrieval of selected archived articles from leading electronic databases and online search services, including Factiva, LexisNexis and ProQuest. For microform availability, contact ProQuest at 800-521-0600 or 734-761-4700, or search the Serials in Microform listings at **proquest.com**.
MAILING LISTS: Primedia Business makes portions of our magazine subscriber lists available to carefully selected companies that offer products and services directly related to the industries we cover. Subscriber who do not wish to receive such mailings should contact the Primedia Business subscriber services at 800-441-0294 or 913-967-1707.
CORPORATE OFFICE: PRIMEDIA Business Magazines & Media Inc., 9800 Metcalf, Overland Park, KS 66212, 913-341-1300, primediabusiness.com.

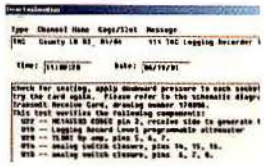
COPYRIGHT 2002
PRIMEDIA Business Magazines & Media Inc.
ALL RIGHTS RESERVED.



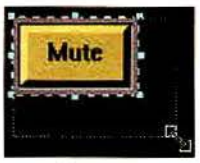
IT TAKES A TOTALLY PROGRAMMABLE RADIO DISPATCH CONSOLE TO MAKE A TOTALLY COST-EFFECTIVE CONSOLE.

MEDIC Diagnostics

Our state of the art built in diagnostics not only spots trouble, it recommends immediate corrective action. This could mean up to a 50% savings in support costs.



MEDIC even spots trouble down to the component level. It's always running in the background to maximize uptime and minimize costs.



You can easily customize any screen. Buttons can be easily resized,moved and changed.

The Radio Dispatch component of the new Moducom UltraCom™ E911/Radio Dispatch Console System is the most flexible system available. Our 100% user programmable touch screens can easily tailor screens for each dispatcher's specific situation. As circumstances change, system wide changes can be made by your technicians instead of costly factory programmers with our built-in tools.

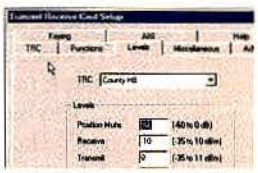
The UltraCom is an all digital 32-bit Windows system, built by us from the ground up - not an assembly of older multiple systems. We build in dual instant recall recorders at no extra cost - saving $5000 per workstation. Our built-in automatic & manual diagnostics can save up to 50% on support costs. And our software upgrades are always free.

Every UltraCom 2000 radio Dispatch console system contains all the software and most of the hardware necessary for a state of the art E911 system. Radio Dispatch and E911 in one single software application means lower costs, greater reliability and more flexibility.

For totally cost effective, totally programmable, totally flexible radio dispatch contact Moducom today.

MODUCOM

COST EFFECTIVE NOW.
MORE COST EFFECTIVE OVER TIME.



System changes can now be made by the customer instead of expensive factory programmers. Levels on audio channels can be easily adjusted.

E911 is part of the UltraCom system software. This means you only need to add minimal hardware to obtain a single application radio dispatch and E911 console system.

E911 Window

Free Demo

Demo our cost saving system software or request a brochure at www.moducom.com or call us at: 818-764-1333

See us at the NENA Show, June 16-20, Booth #549

CIRCLE (8) ON FAST FACT CARD

MODULAR COMMUNICATION SYSTEMS, INC. 13309 SATICOY ST. NORTH HOLLYWOOD, CA 91605. E-MAIL: moducom@ix.netcom.com

Interoperability: It's about saving lives

When a hijacked plane hit the Pentagon on Sept. 11, interoperability helped public safety agencies respond quickly. This incident is just one example of how successful radio communications can save costs, resources and lives.

By James Careless

Interoperability saves lives and speeds response.

At no time was this proven more clearly than on Sept. 11, after the attack on the Pentagon. In contrast to the attack on New York, where a lack of network interoperability hampered rescue efforts, most police, fire and EMS crews responding in the District were able to talk to one another easily. The results—as we shall see—speak for themselves.

The Sept. 11 Pentagon response isn't the only instance in which interoperability has made a difference. Moreover, quick response isn't the only advantage offered by interoperable public radio systems, although it is the most dramatic.

Interoperability also helps to reduce per-agency costs while boosting network performance and coverage. It's a smart way to overcome budget constraints and environmental concerns, and it fosters cooperation among police, fire and EMS agencies.

Increased cooperation cannot come too soon; in the wake of Sept. 11, there's no room for turf fights among public safety services. With the ominous, continuing threat of similar horrific attacks, creating interoperable networks is a good way to foster cooperation on a larger scale and a relatively unthreatening way to begin.

Interoperability can mean putting everyone on a common frequency with common modulation, but it doesn't have to. Sharing portable radios among departments, so that messages can be exchanged during emergencies, is another form of interoperability.

So, too, is the ACU-1000 Modular Interconnect System. As described in the February 2002 issue of *Mobile Radio Technology* ("Chicago Blazes a Trail to Interoperability"), the ACU-1000 lets you plug in as many as 10 radios, whatever their frequencies, and connect them as if you were using a telephone switch.

Careless is a freelance telecommunications writer based in Ottawa, ON, Canada. His email address is *james@tjtdesign.com*.

Project
25
Compatible
Instant
Contact
when you need it!
Two models
One system
Mobile or Portable
136-174 MHz
256 channels
Feature rich
Made in the USA
Best value

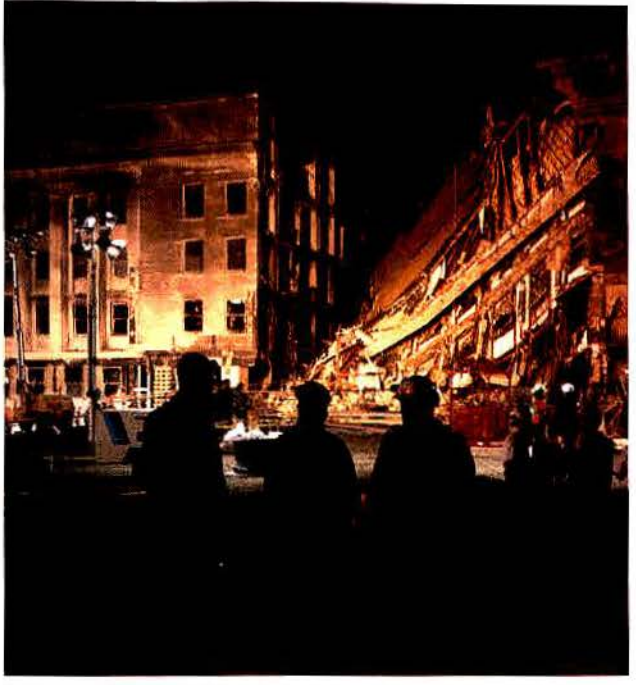
High performance digital radio for government, public safety and business. Features include 16 zones • 4 channel banks • shadow channels user-defined keys • P25 analog, digital, wide and narrowband operation DES encryption • easy-grip knobs • large keys • backlit display • full line of optional Guardian user accessories.

GUARDIAN™ BY DATRON
THE VITAL CONNECTION

TITAN SYSTEMS CORPORATION
DATRON WORLD COMMUNICATIONS DIVISION

Contact us today: 760.597.1500 ▪ www.dtwc.com ▪ guardian@dtwc.com
DATRON WORLD COMMUNICATIONS INC. 3030 Enterprise Ct. Vista, CA 92083

CIRCLE (15) ON FAST FACT CARD



Arlington, VA, Sept. 12, 2001 — Exterior of the crash site following the attack on the Pentagon. *Photo by Jocelyn Augustino/ FEMA News Photo.*

But interoperability isn't just about hardware; it's about cooperation and shared planning—which leads us to Washington.

Interop lifeline

Jan. 13, 1982: Air Florida Flight 90 crashed into the 14th St. bridge during a snowstorm. More than 70 people lost their lives when the wreckage sank into the river.

Police, fire and EMS crews quickly responded to the scene, only to discover that they couldn't coordinate their efforts because they couldn't talk to each other by radio.

Almost 21 years later, the hijacked American Airlines Flight 77 crashed into the Pentagon. Again, lives were lost. But this time, radio communications were different. Local public safety agencies—and the governments that fund them—had learned from the Air Florida tragedy. This time, they *could* talk to each other.

> The bottom line: On Sept. 11, 2001, 'the public safety networks in Washington worked well.' —Deputy Chief John Clayton

In fact, 900 users were able to communicate on an 800MHz digital system, everyone from Washington Police to Arlington County, VA, rescue, plus 48 other agencies. Thanks to mutual aid plans already signed and coordinated by the region's Metropolitan Council of Governments and a history of joint mass-emergency drills by the area's public safety agencies, everyone knew how to work together on Sept. 11.

Best yet, Washington-area agencies had instituted a formal Incident Command System for large emergencies before the attack, so the chain of command was clear.

The bottom line: On Sept. 11, 2001, "the public safety networks in Washington worked well," said Deputy Chief John Clayton of Washington's Fire and Emergency Medical Services. "The only real challenge, as far as radio communications was concerned, was that some out-of-town companies didn't have 800MHz radios, so we had to set up relays."

This one gap in interoperability was cited in a report, "Answering the Call: Communications Lessons Learned from the Pentagon Attack." Issued by the Public Safety Wireless Network Program, a joint effort sponsored by the U.S. Departments of Justice and the Treasury, the report noted that "during the initial response, the majority of local public safety responders experienced no difficulty in establishing interoperable communications on the scene. This was because of the high-level of regional coordination and agreements previously established. However, as the number of state and federal agencies (secondary responders) increased at the site, interoperability presented new challenges. No means of direct interoperability was immediately available to these secondary response agencies."

Nevertheless, the overall response to the Sept. 11 Pentagon attack was a ringing endorsement for interoperability. "It made the difference," said PWSN program manager Rick Murphy. 'The Pentagon incident demonstrated in a very public way how critically important communications capabilities are for public safety agencies."

Florida defense

As monstrous as they are, terrorist attacks aren't the only problems public safety networks face.

In South Florida, various levels of government face radio-related problems. For the U.S. Immigration and Naturalization Service and the U.S. Border Patrol, one challenge involves illegal immigrants from Cuba. For the Florida Highway Patrol, it's watching the region's freeways. And the Miami-Dade Police Department polices one of the nation's busiest areas.

With financial help from PSWN, all three levels of government increased their cooperation. Rather than continuing to operate apart, "we set up three hubs," said the MDPD's Capt. Jesse Varnell. "One handles local government; the second handles state agencies, and the third supports federal users like the INS, the U.S. Customs service, the U.S. Coast Guard and the Border Patrol."

Through these hubs, everyone can talk to one another. "We can go car-to-car with state, federal, and local agencies," said Varnell. "We can also patch an FBI officer through the Border Patrol's hub directly to a MDPD tactical unit, and back again with no problems."

Still, not all of these agencies operate radios on the same wavelength. For instance, the MDPD is on 800MHz, and the state police is on 155MHz.

No problem: PSWN has supplied Dade, Broward and Monroe Counties with a TRP-1000, the transportable version of JPS Communications' ACU-1000 radio switch. "If we're faced with a mass immigration

TEST IT! ANALYZE IT! OPTIMIZE IT!

BERKELEY'S WIRELESS PRODUCTS KEEP YOUR SYSTEMS RUNNING SMOOTHLY!

Mongoose™

SIGNAL STRENGTH METER

For indoor sweeps by propagators.

- Internal memory stores signal strength
- Scans up to 21 channels
- Displays best 3 channels simultaneously
- Outputs data to a PC with a serial cable
- Headphones or internal speaker for audio
- Includes Ni-Cad battery/charger

The Lizard™

1 WATT PORTABLE TRANSMITTER with REMOTE CONTROL

For indoor coverage testing.

- Adjustable power control from 1 milliwatt to 1 watt output
- Infrared remote control adjusts power output, frequency and on-off >25 feet
- Battery operated

www.bvsystems.com/microcell

www.bvsystems.com/drivetest

INDOOR MICROCELL TEST PRODUCTS

WIRELESS LAN TEST PRODUCTS

DRIVE-TEST AND WALK-ABOUT PROPAGATION ANALYSIS

New!

Cricket™

IEEE 802.11 RECEIVER

Tests Frequency Hopping

- Measures coverage for Spread Spectrum (FHSS) wireless networks (wideband IF 1 MHz)

New!

Locust™

IEEE 802.11b RECEIVER

WLAN Drive-Study Analyzer

- Measures direct sequence (DSSS) wireless networks (IF wideband 22 MHz)
- Removable data storage & output capability
- Internal GPS

WLAN Measurements:

- 2.4 GHz ISM band
- Signal strength
- Multipath
- PER (Packet

All BVS WLAN products come with a rugged carrying case, charger, batteries and accessories.

New!

Grasshopper™

IEEE 802.11b RECEIVER

Tests DSSS Networks

- Detects & differentiates from narrowband multi path interference such as microwave ovens & frequency hopping systems

www.bvsystems.com/wlan

The Fox™

RUGGED HAND-HELD SIGNAL STRENGTH METER

Measures RF propagation coverage and detects "RF Shadows".

- High measurement rate, more than twice that of Dr. Lee's recommended 40 λ
- Internal eight channel differential GPS
- Removable PCMCIA memory system for post processing data import to a PC

The Coyote™

DUAL MODULAR RECEIVER

Measures RF propagation coverage and detects "RF Shadows".

Two Independent Receivers

- Dual modular receivers and 12-channel GPS allow users to swap various bands while in the field
- High measurement rate, more than twice that of Dr. Lee's recommended 40 λ plus distance averaging
- Removable, rechargeable Li-Ion battery system
- Removable 8 MByte compact flash memory system

The Gator™

CLASS A TRANSMITTER SERIES

For measuring signal propagation, positioning antennas, setting power levels or validating coverage.

- Available in either 25 Watt Class A, or 45 Watt Class A (10 or 20 Watt Class A for PCS) FCC Type Accepted
- Built-in agile frequency synthesizer
- Remote controllable

BERKELEY VARITRONICS SYSTEMS WIRELESS PRODUCTS

Liberty Corporate Park, 255 Liberty St., Metuchen, NJ 08840

Phone: 732-548-3737

www.bvsystems.com

Fax: 732-548-3404 • E-mail: info@bvsystems.com

We are a Valued Added Reseller for...

symbol

MapInfo

For your convenience we accept...

MasterCard VISA DISCOVER AMERICAN EXPRESS

IEEE 802.11 • PAGING (POCSAG/FLEX) • IS-136 • GSM • LMR • iDEN/SMR • ETACS • CELLULAR • ISM • PCS • WCS • MMDS • UMTS

CIRCLE (10) ON FAST FACT CARD

Today, this interoperable facility is saving money and hassles, while helping its state and federal users save lives.

coming in from the sea, we can drive the TRP-1000 to the scene and plug in our various radios," said Varnell. "This way, we can all communicate with each other."

So, even though they haven't migrated to the same bandwidth, agencies in South Florida can talk to one another as needed.

Montana's new tower and transmitter site, a result of PSWN's funding, is in Red Lodge.

Montana improvement

In Montana, the federal Bureau of Land Management had a radio problem. Its transmitter building at Red Lodge was run down and in need of repair.

The bureau wasn't alone; two other public safety sites in the area were in similar dire straits, said Douglas King, the BLM's telecommunications manager in Montana. "All of the buildings were several decades old and poorly constructed," he said. "We were all ready to tear them down and start again."

Enter PSWN with funding and coordination help. The result: Six agencies—the BLM, the FBI, the U.S. Forest Service, Carbon County, the Montana Department of Transportation and Montana's Highway Patrol—pooled their operations into a single location. Known as the Palisades Project, the new tower and transmitter site is in Red Lodge.

"I think it was the right way to go," said King. "No one single agency could have afforded to build such a facility. In the long run, we'll all save a huge amount of money, while providing solid, coordinated coverage for the public."

The Palisades site construction began in 2000 and soon shut down for much of a long, dry summer because of the fire risk. Then, when winter arrived, the site was buried by snow and the road was taken out by a landslide.

Still, the Palisades site was officially opened in September 2001. Today, this interoperable facility is saving money and hassles, while helping its state and federal users save lives.

Lessons learned

Put plainly, interoperability makes sense. It's a cost-saver, a resource saver and a life-saver.

Moreover, interoperability encourages inter-agency cooperation. This, in turn, improves overall emergency response for police, fire and EMS.

It's as simple as that.

Need Remotes? Call Us

CPI manufactures a complete line of DC, Tone, Local Extension, Multi-Channel, and Multi-line remotes and termination panels for most radio systems.

The CPI line of Multi-Channel remotes includes systems for the Kenwood -80 and -90 series as well as Motorola's CDM1550(LS) and M1225 Series. CPI's new TTP216 tone termination panel is now available and the TR810 console and TR Multi-freq remotes will be available in the next several months.

For Information please contact us: info@cpicomm.com

941 Hensley Lane Wylie, TX 75098
Phone: (800) 869-9128 (972) 429-7160
Fax: (972)429-7165
www.cpicomm.com

CIRCLE (11) ON FAST FACT CARD

Same products. Same people. Same reliability.

New name.

The R2600 family of Communication System Analyzers is now part of General Dynamics. They're the same fine products. Built by the same people. With the same durability and reliability you've learned to trust over the years. The only thing that ***has*** changed...is our name.

So whether your test requirements include iDEN®, ASTRO™, SMARTNET™/SMARTZONE™, SECURENET™ or APCO Project 25, call us.

Be sure to ask about the new features we've introduced this year:

- An available Full-Band Duplex Offset Generator
- RF Frequency resolution down to 50Hz
- Linear Simulcast Modulation (LSM) support for APCO Project 25

And for high-range capabilities at a low-range price, take a look at the R2590, our newest addition to the family—at a price you won't believe.

Call your General Dynamics sales rep today. The name on our products may have changed, but our commitment to quality hasn't changed a bit! Contact us toll free at 1-877-449-0600; in Arizona at 1-480-726-1048; or on the Web at http://www.gd-decisionsystems.com/cte

General Dynamics and the General Dynamics logo are trademarks of General Dynamics Corporation. All other trademarks are the property of their respective owners. ®Reg. U.S. Pat.& Tm. Off. ©2002 General Dynamics Corporation. All rights reserved.

GENERAL DYNAMICS
Decision Systems

CIRCLE (12) ON FAST FACT CARD

Demystifying software radio

Looking for a "magic bullet" two-way radio that covers all frequency bands, all channel bandwidths, all modulation techniques and all control and signaling protocols? Look no more—it's *software-defined radio.*

By Stephen Bartlett

Taken to its logical extreme, a software-defined radio loaded with every imaginable software—plus frequency coverage and a tiny power pack worthy of a science fiction novel—could be used in any mode, on any frequency, anywhere in the world.

In a software-defined radio, transmitter modulation is generated or defined by a computer, and the receiver uses a computer to recover signal intelligence. Need interoperability among public safety agencies regardless of frequency band and standard or proprietary protocol? Need compatibility, wide-area coverage and data features for business users? That's some of the promise—taken to the extreme, mind you—of software-defined radio.

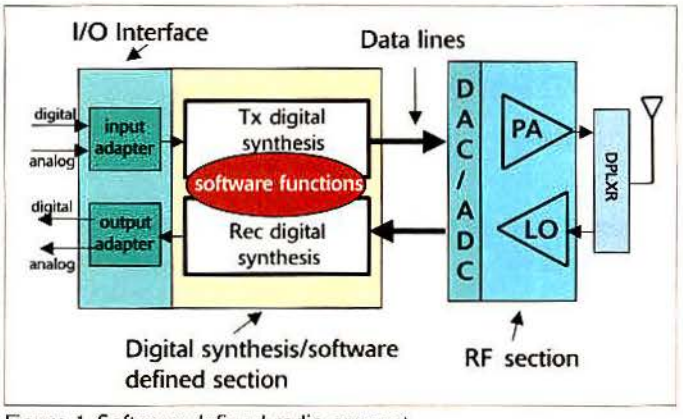


Figure 1. Software-defined radio concept.

Public safety agencies should watch software-defined radio development for its potential to replace expensive network-based interoperability often required for multiple-agency emergency response. Also, it offers first responders the potential to save money on mobile and portable equipment replacement through its compatibility with legacy and future systems.

Commercial mobile radio service providers, as well as business and industrial end-users, can benefit from reduced network management costs, more competitive features and the ability to form wide-area coverage alliances.

If you've recently signed up for the latest cellular or PCS mobile wireless phone services, you've probably had services with choices from: coverage area, free minutes, email service, Web surfing, shoe shining, you name it. Whether you chose all of these, or only a few, you most likely opted for the best coverage you could get for the best price. If so, the phone you now own is one example of a software-defined radio—a programmable, dual-mode (analog/digital), multiband (cellular/PCS) wireless device.

Software-defined radio covers several types of technology and can mean different things. To simplify, three categories can be used to classify SDR technology: multistandard terminals, reconfigurable radios and the flexible architecture radio.

Multistandard terminal — Although not a pure software radio, the MST is a programmable radio (generally a base station terminal) capable of operating on many air interface standards. These terminals support wider roaming areas and provide mobile users with backward- and forward-compatibility as wireless technology evolves.

Reconfigurable radio — Wireless devices with software and firmware that can be reconfigured through programming hardware, including modern dual-mode, tri-band phones and many modern digital two-way radios, fit this category.

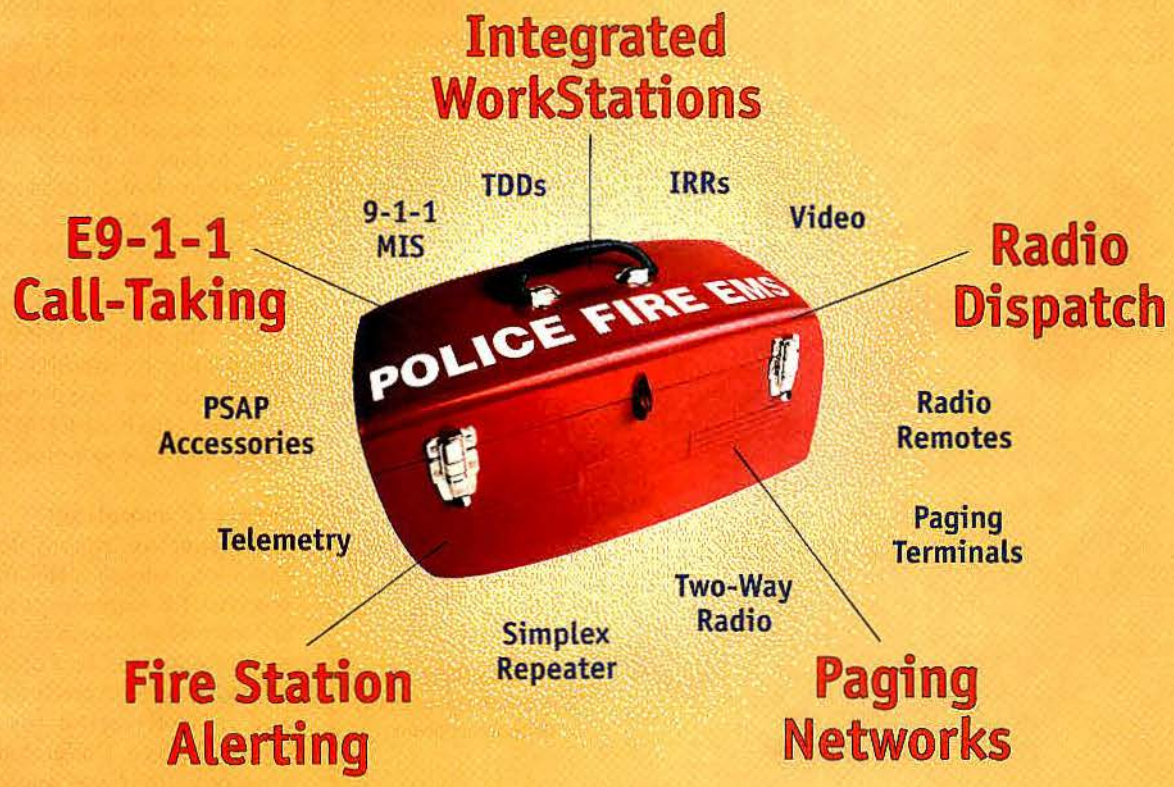
Flexible architecture radio — All characteristics of this radio are programmable. An ideal FAR would be able to configure the number of up and down conversion stages, intermediate frequencies, filter bandwidths, modulation and waveforms, and RF bands. This is essentially the Holy Grail—the "one radio fits all"—of software radio. We're definitely not there yet.

The SDR technology vision is to make common hardware to perform many functions and operate with numerous protocols defined by resident software that can be changed when different functions, features or protocols are required. This can reduce costs with less maintenance and easier upgrading.

Fixed terminals, or base stations, normally are restricted to assigned frequencies and protocols for specific coverage areas. Mobile terminals and handsets require more flexibility to roam between coverage areas, with different frequencies and protocols.

Bartlett is a wireless systems engineer and consultant for terrestrial and space applications. His email address is *radio.bartlett@verizon.net.*

We Have *All* Your Tools



Mission-Critical Communication Systems

Whether you are building a new Communication Control System from scratch or remodeling an existing system, you need the right tools to ensure that you have an absolutely reliable and totally integrated system. Zetron offers a suite of tools designed to consolidate and simplify the task of handling emergency calls and dispatching response teams. From a single telecommunicator position up to 130 integrated workstations, Zetron can configure the perfect Public Safety Communication Control System for your operations. To learn more, call us today.

ZETRON®

Phone: 425.820.6363 **Internet:** www.zetron.com

CIRCLE (13) ON FAST FACT CARD

The software radio can be divided into three sections (see Figure 1): input and output interface, digital synthesis and software-defined section, and RF section. Designers want to keep the information signal digital until it is absolutely necessary to convert to analog. Ideally, the signal stays digital right up to the antenna, where transmit and receive RF stages perform signal conversions associated with RF amplification.

One way to do this in base stations is to string fiber optic transmission line up the tower into the RF "black box" attached to the antenna array. This method would promote the use of more efficient, lower-power, lower-temperature RF circuitry. Without coaxial cable signal losses, less RF power would be necessary for transmission and low-gain, low-noise amplifiers would give satisfactory reception. System downtime and repair or replacement costs caused by moisture that penetrates coax would also be eliminated.

Digital hardware limits — Several technologies must mature before the ideal FAR can be made. The most critical need is for ultra-high-speed digital hardware that can host software with low latency.

When the SDR receiver samples signals digitally to convert them from analog to digital (ADC), or vice-versa (DAC), the sample rate must be at least *twice* as fast as the highest frequency or bandwidth sampled—so says the Nyquist Theorem. The capability to filter the signal in the minimum acceptable bandwidth and the availability of speed-compatible converters (ADC and DAC) dictate where and how sampling is done.

Direct IF sampling

Another approach, direct IF sampling, samples the incoming received RF signal at a rate that is twice the information bandwidth frequency. This approach is also referred to as *undersampling*, and is well-suited for speed-limited devices. Undersampling is an especially clever approach for detecting broad-bandwidth signals (high-speed data and video), but it has limited use in typical, very narrow bandwidth applications (low-speed data and voice). Direct IF sampling can eliminate much of the costly analog hardware needed for demodulation followed by lowpass filters to feed the baseband sampling circuit.

Most common ADC technology limits the rate of passband and direct receiver sampling to an upper bound of 30MHz—about 60 million-samples per second (Msps). Manufacturers of newer high-speed ADCs are quoting sampling rates up to 300Msps or greater, which could sample up to the middle of the VHF band, about

Our Consoles Are Multi-Tasking

Single to Multi-Line and More

The Vega line of remote control consoles are DSP architecture and includes features to control multi-line and multi-channel conventional radios. For additional information on the complete Vega line of products call 800-752-7560 or visit our web site.

TELEX Communications, Inc.

VEGA Signaling Products

8601 East Cornhusker Highway, Lincoln, Nebraska 68507
Phone: (402) 465-7026 • Fax: (402) 467-3279
E-mail: vega@telex.com • Web: www.vega-signaling.com

CIRCLE (14) ON FAST FACT CARD

A Call to Service

We are reminded of the vital role communications professionals play in public safety. Their important efforts can often mean the difference between life and death.

– President George W. Bush
National Public Safety Telecommunications Week 2002

Answer the Call

Attend APCO International's 68th Annual Conference and Exposition

Opryland Hotel Convention Center, Nashville, TN
August 11-15, 2002

For more information contact the
Association of Public Safety Communications Officials, Inc.
www.apco911.org or 1-888-APCO-9-1-1

CIRCLE (9) ON FAST FACT CARD

150MHz. For higher frequencies, the RF signal must be down-converted to a lower frequency.

For now, software-based radios need special hardware for up and down IF conversion, filters and IF amplifiers because of the limitations of high-speed digital electronics. With densely packed integrated circuits, placing enough gates requires unrealistic power and size growth to accommodate the ideal FAR. Most SDRs include high-density application-specific integrated circuits (ASICs) and field-programmable gate arrays (FPGAs). But even these devices are being stressed by the 3G cellular technologies pushing for release. Although these new 3G technologies have been delayed for several reasons, foremost is a lack of practical hardware.

New hybrid digital signal processors, *associative string processors*, incorporate large numbers of specialized processors. Several manufacturers claim to have such devices ready for 3G systems elsewhere in the world.

Software latency – Software will provide ultimate SDR flexibility. The more processors in the hardware, the more software can be a part of the radio—for a price.

Processors generally call for service requests from specific software objects. Making these calls internal to a processor, or externally from another processor in the radio, takes valuable run time. Although internal processor calls have delays in tens of microseconds, external calls may have throughput delays on the order of milliseconds.

Millisecond delays are not usually an issue for typical data traffic, but such delays can be a serious problem for real-time communications such as emergency voice calls. As more features are programmed into the FAR—features are always added—these delays will grow. Delays are not usually an issue for typical data traffic, but can be a serious problem for real-time communications.

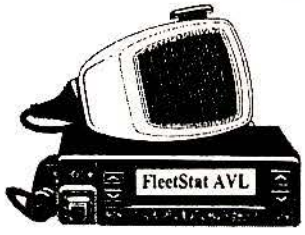
One solution is to move as many of the unchanging FAR functions as possible into hardware and firmware. Then, fewer software functions requiring service requests will need to be accommodated. Even so, as the newer, high-speed, processor-dense hardware becomes available, these systems will become feature-rich, requiring software latency to be closely managed during development to prevent uncontrolled latency growth—a computer evolution lesson learned.

Software radio has passed its newborn stage of development, but it still has a long journey ahead. We will watch it grow up as new commercial wireless systems are deployed. Maybe it's time to take some refresher software courses? ■

Visit our Website at www.cookscom.com

FleetStat AVL

Integrating Voice Dispatch, AVL, and Mobile Messaging in one Economical Unit



- Real time GPS vehicle tracking
- Complete dispatch and mapping software
- Vehicle recording and playback features
- Increased system revenues

Fresno, CA ■ 800-233-8818

CIRCLE (16) ON FAST FACT CARD

Reliable Amplifiers

5 UHF 100 Watt Amplifiers In 10.5 Inches of Rack Space

Crescend TECHNOLOGIES

sales@CrescendTech.com
www.CrescendTech.com
800-USA-MADE
800-872-6233

Crescend offers the most reliable amplifier available for the Land Mobile market. Our new series of amplifier's are built with LDMOS transistors. Our LDMOS amplifiers are more rugged because:

- **LDMOS transistors have higher VSWR rating than bi-polar transistors,**
- **Amplifiers operating voltage of 28 volts DC lowers means lower current through devices.**
- **Better Thermal Properties- the LDMOS transistors are resistant to thermal runaway.**
- **Microstrip Design- We utilize microstrip matching techniques to reduce tuning capacitors.**

CIRCLE (17) ON FAST FACT CARD

ASTRON CORPORATION
9 Autry Irvine, CA 92618
(949) 458-7277 • (949) 458-0826

www.astroncorp.com

E151765 E151765 LISTED 2F29

...POWER ON WITH ASTRON

SWITCHING POWER SUPPLIES...

MODEL SS-10TK

MODEL SS-12IF

SPECIAL FEATURES:

- HIGH EFFICIENCY SWITCHING TECHNOLOGY SPECIFICALLY FILTERED FOR USE WITH COMMUNICATIONS EQUIPMENT, FOR ALL FREQUENCIES INCLUDING HF
- HEAVY DUTY DESIGN
- LOW PROFILE, LIGHT WEIGHT PACKAGE
- EMI FILTER
- MEETS FCC CLASS B

PROTECTION FEATURES:

- CURRENT LIMITING
- OVERVOLTAGE PROTECTION
- FUSE PROTECTION.
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 115 VAC 50/60HZ
OR 220 VAC 50/60HZ
SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8VDC

AVAILABLE WITH THE FOLLOWING APPROVALS: UL, CUL, CE, TUV.

MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (Inches)	Wt.(lbs.)
SS-10	7	10	1¾ x 6 x 9	3.2
SS-12	10	12	1¾ x 6 x 9	3.4
SS-18	15	18	1¾ x 6 x 9	3.6
SS-25	20	25	2¾ x 7 x 9¾	4.2
SS-30	25	30	3¾ x 7 x 9¾	5.0

MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (Inches)	Wt.(lbs.)
SS-25M*	20	25	2¾ x 7 x 9¾	4.2
SS-30M*	25	30	3¾ x 7 x 9¾	5.0

MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (Inches)	Wt.(lbs.)
SRM-10	7	10	3½ x 19 x 9¾	4.3
SRM-12	10	12	3½ x 19 x 9¾	4.7
SRM-18	15	18	3½ x 19 x 9¾	5.0
SRM-25	20	25	3½ x 19 x 9¾	6.5
SRM-30	25	30	3½ x 19 x 9¾	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (Inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9¾	6.5
SRM-30M	25	30	3½ x 19 x 9¾	7.0

MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

MODEL	CONT. (Amps)	ICS	SIZE (Inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9¾	10.5
SRM-30-2	25	30	3½ x 19 x 9¾	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (Inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9¾	10.5
SRM-30M-2	25	30	3½ x 19 x 9¾	11.0

MODEL SS-12SM/GTX

MODEL SS-10EFJ-98

CUSTOM POWER SUPPLIES FOR RADIOS BELOW

EF JOHNSON AVENGER GX-MC41
EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

NEW SWITCHING MODELS

SS-10GX, SS-12GX
SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

CIRCLE (18) ON FAST FACT CARD

*ICS – Intermittent Communication Service

Lattice Communications: EYE ON THE SKY

It's all about vertical real estate, location and customer relationships.

More than 350 towers are located in Alabama, Arizona, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Nebraska, New Jersey, New Mexico, Ohio, Oklahoma, Michigan, Missouri, Pennsylvania and Texas. Lattice Communications is not stopping there. This privately held company not only leases and maintains tower space, but also looks at market portfolios to merge with and/or acquire towers that are in line with its business growth strategy to enhance its national coverage.

With CEO Dean Meiszer's focused leadership, and the 25 employees working with him, Lattice has built its success upon unprecedented responsiveness to their clients and the ability to provide multiple services for multiple sites through a single source. This single point of contact allows their clients to focus on their own core business and leverage Lattice Communications' experience to compliment and expedite the site development process.

The Lattice team, consisting of sales, engineering, business development, merger and acquisition and senior management, thoroughly understands its tower portfolio. They know firsthand what each structure looks like, its location and each specific competitive environment. The company maintains detailed documentation of their sites, reflecting all changes and/or additions in the market.

Lattice has implemented well-defined, fluid processes, which has earned the company the reputation of being efficient, thorough and expeditious. Often customers refer to Lattice Communications as "a breath of fresh air." These processes include:

- **Leasing process, including collocation application; site analysis; master lease agreement (MLA) and site lease agreement (SLA)**
- **Engineering/analysis process**
- **Merger/Acquisition process**
- **Build-to-suit process**

Lattice leverages its depth of experience to provide customers with creative solutions and exceptional service, as well as a sense of partnership. Lattice serves a variety of customers, including PCS, cellular, paging and broadcast providers, and wireless Internet and wireless data providers.

As a full-service tower ownership and site leasing company, Site Leasing Services include:

- Immediate response to engineering needs for siting decisions
- Expedited master lease process
- 24-hour site emergency response
- Site-ready for collocation
- Prime locations

As a full service build-to-suit and build-to-fill site provider to customers, Site Development Services include:

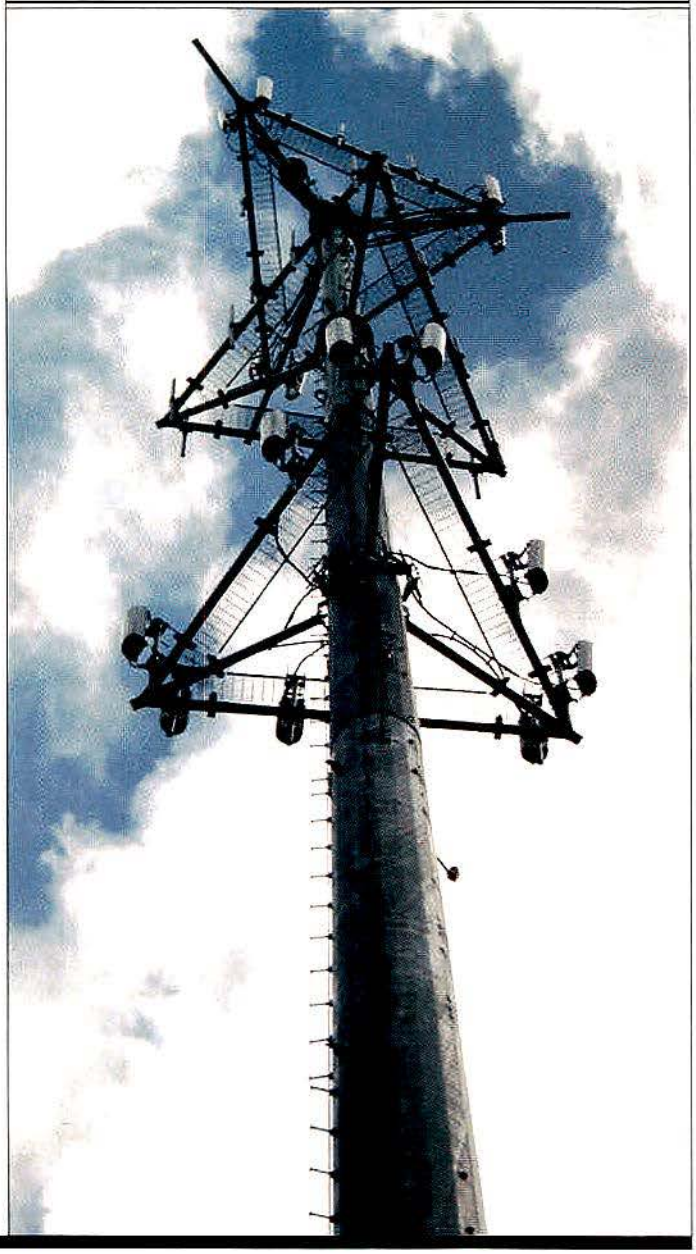
- Site acquisition and zoning
- Construction management
- Problem site solutions
- Project tracking reports

Founded/Ownership:

Founded in March 1999. A privately held company formed by a group of investors led by Lattice Investors, Ltd. (a Robert Bass affiliated organization), Cinergy Communications, Inc. (a subsidiary of Cinergy Corp. A gas and electric utility), and Lattice Partners, Ltd.

For more information on Lattice Communications LLC, please visit our web site at **www.latticecommunications.com** or call (877) 832-0699.

Lattice Communications
441 Vine Street,
Suite 3900
Cincinnati, Ohio 45202



Lattice Communications

Site Leasing

- Expedited Master Lease process
- 24/7 site emergency response
- Prime locations

Site Development

- Site acquisition and zoning
- Construction management
- Problem site solutions

Site Management

- Site maintenance
- Site security
- 24/7 alarm monitoring

Call (877) 832-0699 or visit www.latticecommunications.com

CIRCLE (19) ON FAST FACT CARD

For more information on the advertisers in this issue, check out their Web sites or refer to the Advertisers' Index on page 40.

Berkeley Varitronics Systems

The Beetle is a handheld, low-cost 802.11b WLAN tool for installing and maintaining DSSS networks. Beetle measures and displays all 14 DSSS channels, all MAC addresses as well as PERs (packet error rates) and WEP encryption detection.

WWW.BVSYSTEMS.COM

Control Signal

Since 1972, Control Signal has manufactured digital ANI and Morse code station identifiers. The microminiature ANI has Motorola MDC-1200 and caller ID signal formats and can fit in the smallest radios.

WWW.CONTROLSIGNAL.COM

CPI Communications

The MCR Alpha series remotes provide remote control of Motorola's Maxtrac, Radius GM300, Kenwood TK630/730/830 and Midland's Syntech XTR radios. The remotes display channel number and programmable name.

WWW.CPICOMM.COM

Crescend Technologies

Crescend Technologies is an amplifier company offering reliable amplifiers for the land mobile market. The company is developing new technologies to help customers succeed.

WWW.CRESCENDTECH.COM

Communications Specialists

Communications Specialists' tone-signaling products include CTCSS, DPL, ANI, two-tone sequential shared repeater tone panels, Morse code identifier, voice encryption and narrowband filter kits.

COMSPECIALISTS.COM

Datron World Communications

The Guardian portable, mobile and trunk radios offer the P25 FDMA common-air interface for complete interoperability in radio service pools incorporating the P25 standard. It is also fully backward-compatible with conventional wideband FM systems.

WWW.DTWC.COM

E. F. Johnson

E. F. Johnson is a leader in the engineering and manufacturing of land-mobile, two-way radio systems. Its customers' needs range from simple base-to-mobile dispatching to complex, wide-area communications systems, a significant part of the business. Its research and engineering teams pioneer new technology for more advanced digital radio systems.

WWW.EFJOHNSON.COM

Futurecom Systems Group

Futurecom provides RF coverage extension products and systems, facilitating wide-area, local-area and enclosed-area coverage. Its main products include channel-selective repeaters, tri-band directional smart-line amplifiers, cross-band and in-band vehicular repeaters.

WWW.FUTURECOM.COM

IDA

IDA is a leading designer and manufacturer of LTR trunking controllers, DTMF microphones, desktop remote controllers and mini consoles including trunking, tone, dc, VoIP and APCO P25-compatible equipment. Other offerings include AVL systems, mobile data equipment, dispatch networking systems, LTR kits for Motorola radios and FleetSync CAD/messaging software.

WWW.IDACO.COM

JPS Communications

JPS Communications manufactures receiver comparators that vote conventional analog and trunking signals, cross-band interfaces that interconnect multiple radio bands and radio VoIP interfaces for wide-area interoperability systems.

WWW.JPS.COM

Midian Electronics

Midian Electronics manufactures voice encryption and tone signaling products for two-way radio. These products are used by public safety, fleet and industrial users.

WWW.MIDIANS.COM

M/A-COM

M/A-COM's Opensky wireless private network is a packet-switch digital mobile communications network with integrated voice and data. It operates over an IP backbone.

WWW.MACOM.COM/OPENSKY

Modular Communications Systems/Moducom

The UltraCom E9-1-1/ radio dispatch console system is a cost-effective, digital, user-programmable system with pop-up windows and built-in diagnostics. It is a single software application; just add hardware. The software is upgraded for free. For a free demonstration, see the Web site.

WWW.MODUCOM.COM

Norcomm

The model NC804 is a microminiature voice plus rolling code encryption

It Stands Alone!

®RAPID ANALYZER I

Battery Analyzer / Conditioner

(NEW)

3 Minute Analyzer
Battery Packs & Cells
(Ni-Cd, Ni-MH, Li-ion)

Impedance Test
25 Seconds
(Ni-Cd, Ni-MH, Li-ion)

One Cup Will Work With
(Ni-Cd, Ni-MH, Li-ion)
Various Capacities

Computer Interface
Ready

Most Cost Effective Unit
In the Market

Many Additional Features
Call 800-221-0732
or Visit Our Website
www.ww-manufacturing.com

+W&W- WHERE QUALITY IS #1

W&W MANUFACTURING CO.

800 South Broadway, Hicksville, NY 11801 • In USA & Canada: 800-221-0732
In NY State: 516-942-0011 • Fax 516-942-1944 • E-Mail: email@ww-manufacturing.com

www.ww-manufacturing.com

CIRCLE (20) ON FAST FACT CARD

scrambler designed to provide high-level security for two-way radio voice communications systems.
WWW.NORCOMMCORP.COM

Telex Communications

Vega and Land Mobile Products Group

Telex is a manufacturer of communications VoIP control consoles (from a single line to 24-line), radio termination adapter panels, amplifiers, line bridging modules, and radio headsets and ear microphones designed to be used with most portable radios. Combat and SWAT headset designs fit comfortably under helmets or around the head.
WWW.VEGA-SIGNALING.COM

TELEWAVE, INC.

Telewave

Telewave designs and manufactures antennas, combiners, filters, towertop preselectors, duplexers, wattmeters and many other wireless system products covering 2MHz to 2.7MHz.
WWW.TELEWAVE.COM

Thunder Eagle

Thunder Eagle is a designer, manufacturer and distributor of weather alert radios for emergency management and other professional users.
WWW.THUNEAGLE.COM

STANDARD HORIZON

Vertex Standard

With experience in land mobile radio, Vertex Standard offers a wide variety of public-safety equipment from cross-band repeaters to public safety portables and mobiles.
WWW.VXSTD.COM

W&W Manufacturing

W&W Manufacturing manufactures two-way radio replacement batteries, chargers and analyzer/conditioners. More than 200 charger and analyzer adapter cups are available for land-mobile radios, cellphones and laptops.
WWW.WW-MANUFACTURING.COM

ZETRON

Zetron

The model 4020 is a 20-channel, common controller that supports as many as six Series 4000 operating positions, including the model 4217NT dispatch workstation, the model 4217B CRT console, the model 4118 rackmount button console and the model 4018 desktop button console. The architecture is identical to the model 4048.
WWW.ZETRON.COM

THE AFFORDABLE INTEROPERABILITY SOLUTION.

JPS Communications, Inc. is the premiere provider of mission critical Interoperability solutions. Direct communications between local, state and federal agencies at the scene of a incident, regardless of radio frequency, type, make, or model, including TETRA, has never been Easier!

VISIT US AT UTC BOOTH # 116

ACU-1000 Intelligent Interconnect

CALL US TODAY FOR MORE INFORMATION!

5800 Departure Drive
Raleigh, NC 27616
Ph: (919) 790-1011
Fax: (919) 790-1456
Email: jps@jps.com
Web: www.jps.com

CIRCLE (21) ON FAST FACT CARD

We Build Communications Consoles That Provide Better Solutions.

We're a different kind of company with a different kind of product. Building dispatch console systems is our only business, so you can count on every product we deliver.

Our systems provide everything you need. Digital Signal Processors are employed in digital multi-line, multi-operator console configurations, giving dispatchers access to each other and any resource in the system. An advanced color touch-screen console, combined with a powerful digital switch, assure instant responses through our unique distributed architecture. You can count on Avtec systems every time, all the time.

Reliability, flexibility and superb support when you need it. To learn how Avtec can provide the solutions you need, call 803.892.2181 or e-mail sales@avtecinc.com today.

Avtec

4335 Augusta Highway
Gilbert, South Carolina 29054 USA
Telephone: 803.892.2181
Fax: 803.892.3715
Website: www.avtecinc.com
© 2000, Avtec.

CIRCLE (22) ON FAST FACT CARD

Nextel's international unit files for bankruptcy protection

A unit of Nextel Communications, Reston, VA, has filed for protection from creditors under Chapter 11 of the U.S. Bankruptcy code.

NII Holdings (formerly named Nextel International Inc.), announced on May 24 that it would restructure its debt, reducing the amount it owes creditors from $2.7 billion to less than $500 million. In reaching an agreement with creditors, the company made a commitment to obtain $190 million in new capital, including $140 million from bondholders. Nextel Communications would provide the remaining $50 million in return for a cross-border, spectrum-sharing agreement.

Nextel Communications lost an estimated $2 billion that it invested in NII, including about $750 million in cash and stock poured into the company during 2001. At the end of last year, the parent company wrote off $1.7 billion of the amount it had spent on NII.

After the restructuring, creditors will own 55% of NII, with Nextel Communications' stake reducing to 45%.

Motorola has agreed to defer principal payments on the secured vendor financing it provided for NII's purchase of its equipment.

Unsecured creditors also are to receive equity in the reorganized company. *—DB*

Feds give Johnson $1.2 million P25 order

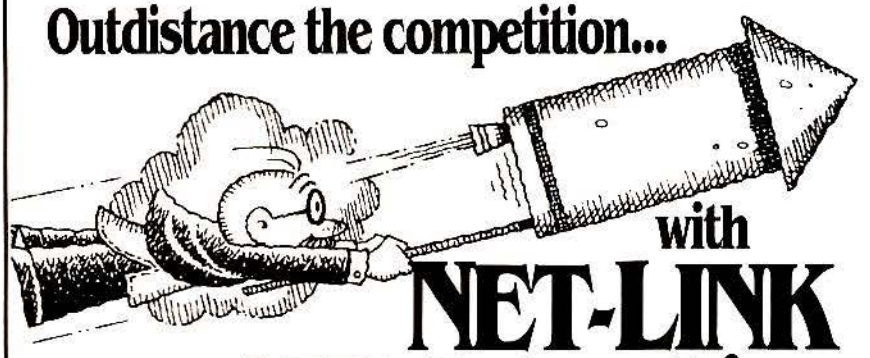
The E. F. Johnson company has received a $1.2 million order for Project 25 digital radio products from an unspecified agency of the federal government.

The agency ordered 100W mobile radios with hand-held controllers from Johnson, a subsidiary of Lincoln, NE-based Transcrypt International. Transcrypt's chairman, Michael E. Jalbert, said that the company previously supplied such radios to the federal government and expects additional orders.

David L. Hattey, Johnson's president, said that the company's market share of federal government sales has increased thanks to the P25 product line.

—DB

Outdistance the competition...



with NET-LINK LTR® Networking

Connect with a LTR® Networking system that will go the distance! **NET-LINK** is a software and hardware package that provides multi-user and multi-site linking between LTR® trunking systems.

With all the features your customers need and the return on investment your banker demands, **NET-LINK** eliminates the need for phone lines, microwave, or even other radio frequencies. No DTMF mics or other complicated signalling methods are needed—making **NET-LINK** nearly transparent to the end user.

See how you can shoot ahead of your competition by offering a larger service area.

Call IDA now and put yourself in the lead with NET-LINK.

IDA CORPORATION
1345 Main Ave. Fargo, ND 58103
1-800-627-4432 / 701-280-1122
218-233-1886 fax
www.idaco.com

LTR® is a registered trademark of EF Johnson.

CIRCLE (23) ON FAST FACT CARD

Receive Weather Alerts Automatically

on your 2-way radio system, PA system, voice-mail, numeric pager or telephone!

- Rack-mount and mobile systems
- Warnings digitally recorded for DTMF access and playback
- Designed specially for demanding Public Safety use

Call toll free 1-888-877-8022 or visit our Web site at: http://www.thuneagle.com

NOAA Weather Radio

THUNDER EAGLE, INC. Wireless Alerting Systems

U.S. Patents 5,444,433 - 5,574,999 - D.377,795

CIRCLE (24) ON FAST FACT CARD

WHY CHOOSE THE NEW 5100 PORTABLE FROM EFJOHNSON?

WE'LL GIVE YOU MULTIPLE REASONS.

Multiple protocol compatibility:

- Project 25 Trunking
- Project 25 Conventional
- SMARTNET™ II
- SmartZone®
- Multi-Net®
- Conventional

In a flash, the new 5100 portable will support many communication systems in operation. Cleverly combining an RF module with a computer processor creates the new 5100 Series, a portable radio designed by users who demand the most from communications—you.

Now Available!

299 Johnson Ave., Waseca, MN 56093 1-800-328-3911 www.efjohnson.com

EFJohnson/Viking Head logo and Multi-Net® are registered trademarks of E.F. Johnson Company.
SMARTNET™ and SmartZone® are trademarks of Motorola Inc.

EFJohnson®

CIRCLE (25) ON FAST FACT CARD

20 years of consolidation: Bigger is not always better

As our magazine celebrates its 20th year, Pete Brake takes a look in the crystal ball:

Hindsight is 20/20. So instead, I'm going to go out on limb (not an unfamiliar perch for a small business person in the 21st century) and discuss what I see happening in the wireless industry over the *next* 20 years.

The last couple of decades have seen consolidation, with bigger players acquiring many of the smaller ones. This has reduced the number of competitors, but it has not made the marketplace any less competitive. As a smaller player still hanging on to independence, I sometimes recall a concept a friend from the medical profession shared with me. He told me about the theory that "nature tends to the norm." In other words, even as we evolve, nature seeks a leveling point.

Nature senses when the relationship is unbalanced—as when two prize-winning horses have been bred to produce an individual that has received traits in part from one parent and in part from the other. But the two just don't fit to produce the same mechanics.

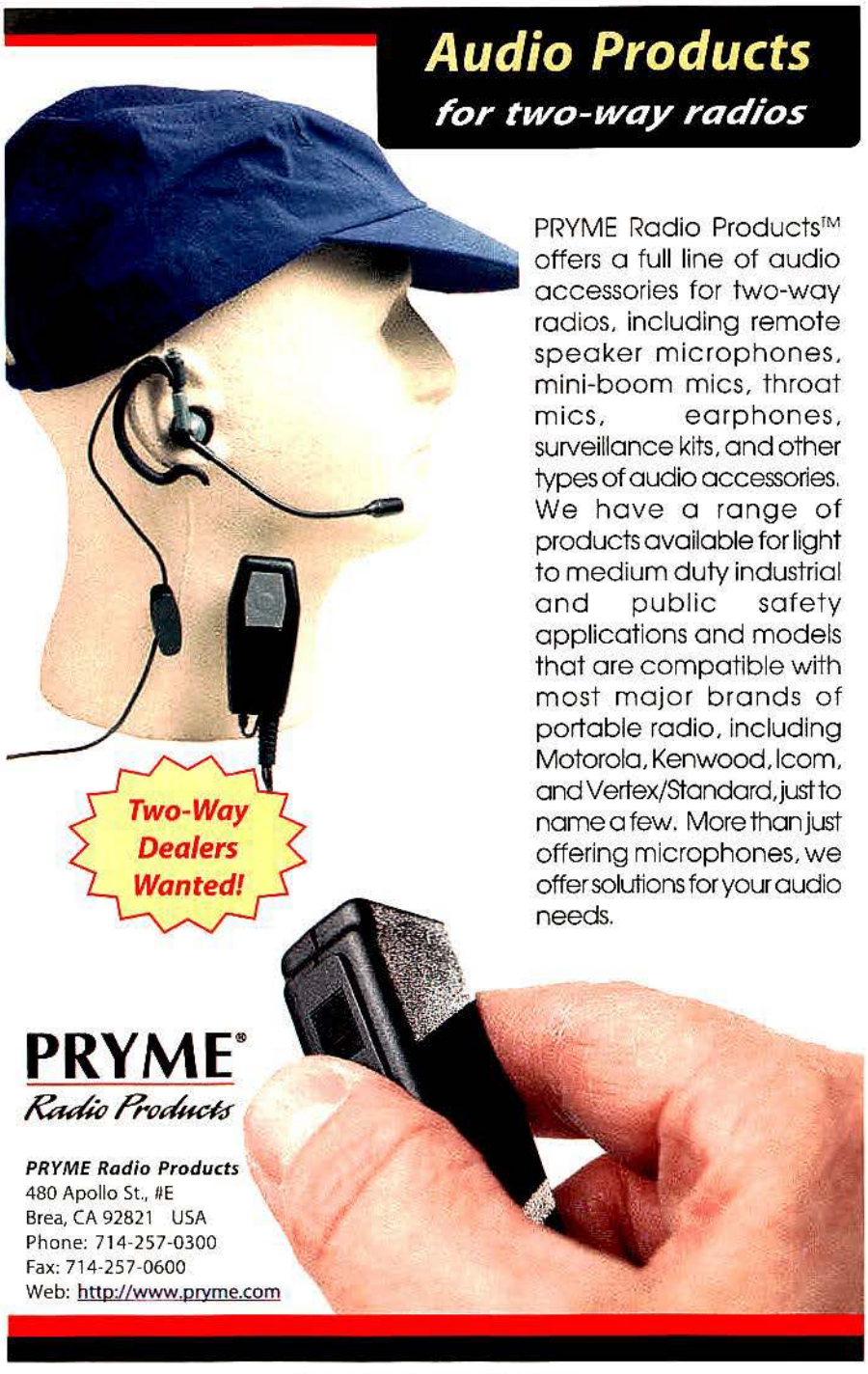
The same is true in business. Although merging two companies may make a more impressive entity, the combination may be less effective. Bigger is not always better.

First, we smaller companies have the ability to respond more quickly to emerging trends, and second, we have the capacity to provide stellar customer service. By consistently leveraging our flexibility and service capabilities, we will continue to find successful niches within the wireless communications field.

On the other hand, the FCC and other regulatory agencies tend to favor larger companies. Bigger organizations will continue to have the ear of decision-makers in a way that smaller entities seldom do.

So, as "nature tends to the norm," small companies have the opportunity to thrive through flexibility and responsiveness and larger organizations can flourish through volume and influence. Ultimately, there will be a place for all of us to prosper during the next 20 years.

—Peter D. Brake
President and General Manager
A/F CommSupply
Lenexa, KS

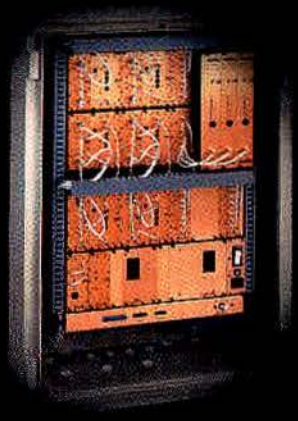


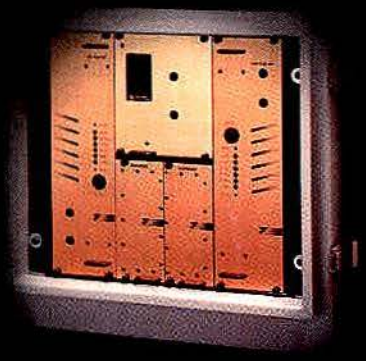
CIRCLE (26) ON FAST FACT CARD

broad-band amplifiers

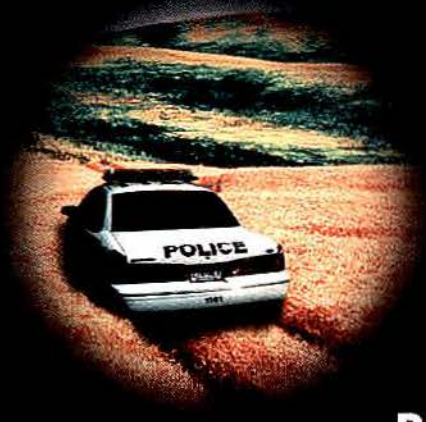
vehicular repeaters

channel-selective repeaters





www.FUTURECOM.com



RF coverage by design

1-800-701-9180

CIRCLE (27) ON FAST FACT CARD

Lightning protectors handle induced signals

Huber + Suhner's 3406 Slim Line lightning protectors provide surge protection for links between indoor and outdoor wireless communications equipment connected to coaxial lines to 5.8GHz, including base stations and subscriber units. The gas capsules' protection principle supports simultaneous transmission of RF, data and dc. The gas capsules are fixed integrated. The protectors can handle any induced surge signals, including a one-time 10kA strike or multiple 5kA strikes. Slim Line is available with N, TNC and BNC connectorization and is bulkhead-mountable.

WWW.HUBERSUHNERINC.COM

Rods offer low-impedance grounding

The K-Rod from **ERI** offers low-impedance grounding. The product is available in vertical and horizontal configurations and in single-piece lengths from four to 20 feet. The rods are also available with silver solder flange connections, which allow continuous lengths to more than 100 feet. The copper K-Rod constantly conditions the surrounding soil with a self-contained electrolyte enhancer.

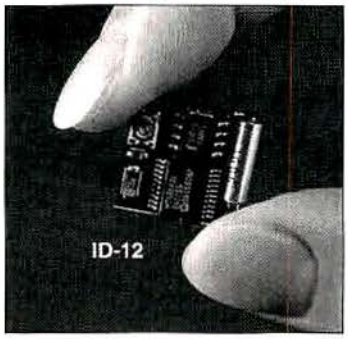
WWW.ERIINC.COM

Catalogs feature grounding equipment

Sabre Site Solutions' catalogs include Sabre lightning kits and grounding equipment. The *Tower Parts and Accessories Catalog* and *Wireless Equipment Catalog* expand Sabre's offerings to include thousands of products and accessories. The catalogs include antennas, antenna mounts, transmission line, transmission line accessories, tower and site accessories and hardware and tools.

WWW.SABRECOM.COM

Digital ANI MDC-1200® Signaling



CSC | CONTROL SIGNAL
www.ControlSignal.com

Control Signal's ID-12/1201 is an economical **MDC-1200** ANI system. The ID-12 encoder works in all radios and fits in virtually all handhelds and mobiles. The ID-1201 decodes any **MDC-1200** ANI signal, has a large LED display, a printer port and an RS232 port.

MDC-1200 is a registered trademark of Motorola Inc.

800-521-2203 • 303-989-8000 • Fax 303-989-8003 • www.ControlSignal.com

CIRCLE (28) ON FAST FACT CARD

Binding post makes connections to ground

Superior Electric's all-metal grounding BP-30GP10 5-Way binding post makes rapid connections to ground. The binding post is nickel-plated and polished with finely machined brass. Its functional design complements other standard-size hex nut 5-Way binding posts.

WWW.SUPERIORELECTRIC.COM

Monitor warns of ground degradation

Lyncole XIT Grounding's GRM 2000 RS monitors ground system performance and provides an early warning of ground system degradation or loss of integrity. The system consists of a permanent wall-mounted meter and a sensing head (attached to the grounding system conductor). The meter features high- and low-level alarms for instantaneous notification when the pre-set resistance values are exceeded. It features continuous monitoring of ground system resistance and current and has an RS-232 output, with remote reading and control capability.

WWW.LYNCOLE.COM

Crimping tool works in one hand

FCI's Burndy Patriot (PAT750-18V) tool offers fast crimp time, ergonomic design and an 18V NiMH battery. The tool features a pump, transmission and piston design. The self-contained hydraulic tool provides connection to 750kcmil and efficient operation.

WWW.FCICONNECT.COM

The New Field-Proven Site Master Performs Even In The Toughest Environments.

Getting there and back is up to you.

The new C-Series Site Master features a handheld, battery-operated, field proven design so powerful, yet so small, that it fits in your backpack. Thousands of technicians just like you, have chosen Site Master because of its industry leading immunity to RF interference, ease of use, and its ability to pinpoint small, hard to find problems before major failures occur. New features such as on-screen test set-ups, multilingual user interface and InstaCal™calibration further set the new Site Master apart from others.

Is it any wonder why Site Master is the world's best-selling cable and antenna analyzer? So, whether you're climbing a mountain or crossing a desert, your Site Master is built to perform under the harshest conditions. How well you'll hold up, we can't guarantee.

For more information call 1-800-ANRITSU or visit us at www.us.anritsu.com/SiteMasterC/. The Site Master from Anritsu. The preferred choice among leading network operators and service providers worldwide.

Anritsu

Discover What's Possible™

Site Master C-Series

©2001 Anritsu Company Sales Offices: USA and Canada 1-800-ANRITSU, Europe +44-1582-433433, Japan 81(03)3446-1111, Asia-Pacific 65-2822400, South America 55(21)527-6922, www.us.anritsu.com

CIRCLE (29) ON FAST FACT CARD

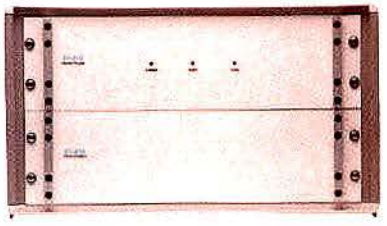
Product Encore

Antenna operates with integral ground plane

Telewave's ANT150F2 is a compact, omnidirectional collinear antenna with an integral ground plane, which covers 148MHz–174MHz. The antenna is enclosed in a rugged structural composite radome, with a total height of only 60". The antenna's gain is 2.5dB minimum, with a nominal power rating of 500W. The vertical beamwidth is 38°, allowing RF coverage of low-lying areas such as valleys and canyons. This antenna is useful for replacement of old VHF groundplane or "J-hook" type antennas. N female or optional 7/16 DIN female connectors are available. The ANT750F2 is a similar antenna that covers the 734MHz–806MHz range. Shadowing and multipath common in the upper UHF bands can be greatly reduced with this antenna. The model ANT750Y5-WR is a heavy-duty directional yagi antenna that covers 734MHz to 806MHz. The gain is 5dBd minimum, with a nominal power rating of 500W. The antenna is coated with Txylan material to eliminate damage from corrosion. The active element connection and feedline are sealed inside the antenna boom.

WWW.TELEWAVE.COM

Network switch offers wide-area coverage



SmarTrunk Systems' ST-510 network switch provides multisite, wide-area roaming capability for any SmarTrunk II system. System operators can link 32 individual sites into a single, integrated communications network. Subscribers can also have several new, advanced features such as voice prompts, digital voice mail and call.

WWW.SMARTRUNK.COM

Voice Logging Recorders...

automatically document phone conversations, meetings and two-way radio messages – compact, affordable, easy to install, operate, upgrade, maintain and purchase...

★ Digital and Analog
★ 1 to 16 channels
★ $190 to $7840
★ 12 off-the-shelf models plus custom systems to meet unique requirements
★ Multi-channel recorders store 1600 hours on internal hard drive and back up on CDRs ★ Multi-function single channel recorder stores 1350 hours on internal HD
★ Conference recorders and microphones ★ Call center supervisory recorders ★ Software and hardware that turns your PC into an automatic voice logger
★ Over 1000 dealers worldwide ★ Dealer inquiries welcome
★ **Omnicron** – Providing affordable solutions for archival voice storage and supervisory monitoring **since 1975**.

omnicron
OMNICRON ELECTRONICS
581 Liberty Highway
Putnam, CT 06260
860•928•0377
FAX: 860•928•6477

www.omnicronelectronics.com

CIRCLE (30) ON FAST FACT CARD

RUGGED 75 AMP POWER SUPPLY

Anchors NEW DuraComm "DPS" Series Line

Now in 15, 30, 45, 55 and 75 amps @ 12VDC (adjustable output)

- 15.5 and 25 amp versions @ 24VDC (adjustable output)
- Protected against brownout and AC spike input to 190 volts
- Reverse battery polarity, over-current & over temp protected
- UL/CUL Listed

Microprocessor controlled automatic 3 stage smart charger option can be used with all DPS converters... increases charge capacity, decreases charge time, prevents over-charging.

Contact your communications distributor or call or fax us Toll Free

Phone 1•800•467•6741 Fax 1•800•825•1403

DuraComm® CORPORATION

203 W. 23rd Ave.
North Kansas City, MO.
64116

On the Web at www.duracomm.com
Email: duracomm@duracomm.com

CIRCLE (31) ON FAST FACT CARD

Software manages SmartZone systems

GenSZAI (Genesis SmartZone Airtime Interface) from **The Genesis Group** captures all of the ATIA call packets and puts them into an SQL database. The database is used for all of the reports, graphs and queries that occur within the system. The information is accumulated and available for reporting on a near real-time basis. GenSZAI and NetVista work together with Microsoft Excel for reporting capability. Each report and graph is selectable and available on demand. The software is shipped with dozens of "canned" and custom reports. Clients can create their own ad hoc reports. Some of the canned reports include all airtime, PTTs & total airtime, busy seconds, top 40 talkgroup busies and PTT quantity & length.

WWW.GENESISWORLD.COM

Analyzers offer enhanced menu-driven interface

Anritsu's five new Site Master transmission line and antenna analyzers are designed with a configuration that detects cable feedline and antenna system problems. The menu-driven interface has been enhanced to include cable-specific folders of popular cables. The characteristics of the cables and all appropriate testing parameters are programmed in the folders, which eliminates setup error and ensures sweep accuracy. The feature complements the existing menu operations. The menu-driven interface has the ability to store as many as 10 test setups for repeatable testing, and it can store as many as 200 measurement traces in nonvolatile memory.

WWW.US.ANRITSU.COM

High-speed paging system uses GPS

Zetron's high-speed simulcast paging system uses GPS information to synchronize the transmission of paging signals to tight tolerances. This provides timing accuracy to within a few microseconds, which is necessary for many paging formats such as the Flex protocol. The system is intended for public or private paging system operators that use multiple transmitters and wish to create new paging systems or to build out existing systems into new regions. Each system consists of a model 600 Wireless Data Manager and one or more model 620 wireless data encoders.

WWW.ZETRON.COM

Classifieds - Professional Services

Computer Software 35
Employment 34
Equipment For Sale 34
Professional Services 33
Rentals and Repairs 36
Tower Services 37
Licensing 37

Dawn Rhoden
Classified
Advertising Manager
Phone
800-347-9375

MCCON
Mobile Communications Consulting
S.R. McConoughey, P.E.
Principal
13017 Chestnut Oak Drive
Gaithersburg, MD 20878 (301) 926-2837

GE PORTABLE SERVICE
- FAST TURN
- WARRANTY
- $48.00 hr./2 hr. MAX
- PARTS GE LIST
- RETURN UPS PAID

Smith Communications Service
2121 W. Parrish Ave., Owensboro, KY 42301
270-683-0936

PORTA-TECH PORTABLE TECHNICAL SERVICE, INC
493 Crowell Lane • Lynchburg, VA 24502
FACTORY TRAINED TECHNICIANS FOR QUALITY SERVICE
GE Portable Radio Service Depot
Factory Approved Nationwide
- Current Product Lines
- Voice Guard Certified
- Public Service Trunking
- Surface Mount Technology

ERICSSON
(434) 239-3049

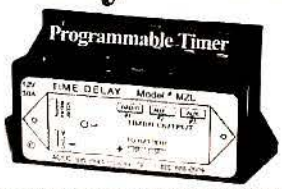
FREDERICK G. GRIFFIN, P.C.
2938 Waterlick Road
Lynchburg, VA 24502
(434) 237-2044
NATIONWIDE COMMUNICATIONS CONSULTING
Mobile Radio, Microwave, E9-1-1,
CAD, Paging, LAN,
Dispatch Communications Centers
Multi Site Propagation Analysis

SCHWANINGER & ASSOCIATES
Attorneys at Law
Robert H. Schwaninger, Jr.
1331 H Street N.W. Suite 500
Washington, DC 20005
Ph- 202-347-8580
Fax 202-347-8607

TROTT
COMMUNICATIONS GROUP
RAYMOND C. TROTT, P.E.
Chairman
1425 Greenway Drive, Suite 350
Irving, Texas 75038
972/580-1911 • Fax: 972/580-0641

The only address you need to address FCC RF Radiation and OSHA regulations.
www.rfcomply.com
RSI
Radiofrequency Safety International Corp.
Ph: 888-830-5648
"Safety is our middle name"

Delay Timer



"ON WHEN IGNITION IS OFF"

- Battery & Equipment Protection Device
- Low/High Voltage load shut down
- Allows retrieval of data for MDT, GPS, AVL
- 30 AMP 12 Volt DC
- Low voltage sensor (10.5V) - Over voltage protection (17V)
- One year warranty.

WIG-WAG
HEADLIGHT FLASHER
100% SOLID STATE

- Power: 12 volts, negative ground system
- Up to 4 different patterns
- Flash rate: Nominal 1.9 per second on wigwag pattern
- Lamp Wattage Capacity: 180 watts
- Current Output: 15 Amps
- Size: L 4" x W 2" 1/8 x H 1/2" ~ Wt 3 1/2 oz.
- For all US made vehicles

AC/DC INDUSTRIES
P. O. BOX 710548, HOUSTON, TEXAS 77271
Tel: (281) 933-0909 • Fax: (281) 933-1001
Toll Free: 800-888-0909
Web-Site: www.acdcind.com
E-mail: sales@acdcind.com

CIRCLE (100) ON FAST FACT CARD

COMPLETE CHANNEL ELEMENTS
YOUR FREQUENCY
LIFETIME GUARANTEE
Most Elements $20.00 with Trade

Crystals
We Buy Used Elements

NKX
1814 Hancock St.
Gretna, LA 70053
504-361-5525 (in LA) • 800-237-6519
FAX 504-361-5526

All CCII Labels

WHITE, ORANGE, GREEN AND RED BUTTONS AVAILABLE

$12.50 ea

CCII PROGRAMING AVAILABLE

ORDERS SHIPPED IN 14 DAYS

NORTHEASTERN
Communications, Inc.
Waterbury, CT (203) 575-9008

TWO WAY RADIOS & ACCESSORIES
BASE ANTENNAS
MOBILE ANTENNAS
PORTABLE & GPS ANTENNAS
COAX CABLE & CONNECTORS
RECHARGABLE BATTERIES
RF AMPLIFIERS
REPEATER & INTERFACES
ENCODERS & DECODERS
LIGHTNING PROTECTORS
DUPLEXERS
TOWER SECTIONS
POWER SUPPLIES
PROGRAMMERS
SOLAR MODULES
DC AC INVERTERS
DC-DC CONVERTERS
RF TEST EQUIPMENT

Immediate Delivery, Warranty & Service

High Quality at Affordable Prices..!!

EPCOM

MIAMI, FL.
7262 NW, 54 St
(305) 889-1127 FAX 889-0652
MIAMI, FL 33166 U.S.A.
E-mail epcom@bellsouth.net

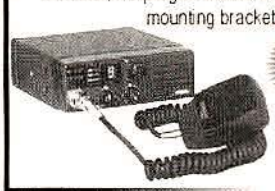
Ask for your free Catalog

EL PASO, TX
1630 PAISANO DR
(915) 533-5119 FAX 542-4701
EL PASO, TX 79901 U.S.A.
www.epcom.net epcom@whc.net

CIRCLE (101) ON FAST FACT CARD

Employment

uniden® BRAND NEW
Mobile radio, 25 Watts
10 Channels, built-in channel scanner with lockout and priority. Multiple CTCSS/DCS Decoder/Encoder, volume control squelch, TOT, BCLO, LED channel indicator, PC programmable, microphone and mounting bracket.



1 Year Warranty

Dealers Prices
SMH-1525. VHF, 148-174MHz. *$129.*
SMU-4525. UHF, 450-470MHz *$139.*
Free Programming !

EPCOM

1630 Paisano Dr. **EL PASO, TX** 79901 USA
(915) 533-5119 Fx (915) 542-4701
www.epcom.net epcom@whc.net

7262 NW, 54th St. **MIAMI, FL** 33166 USA
(305) 889-1127 Fx (305) 889-0652
epcom@bellsouth.net
Ask for your free EPCOM Catalog

Metro Communications, an Authorized Motorola Two-Way Dealer, has an immediate opening in Knoxville, Tennessee for a Technician. Minumum of 5 years experience required. Excellent salary. Approx $40K

Contact Phone: (865)546-0311
Or e-mail metrojjr@bellsouth.net

WIRELESS COMMUNICATIONS TECHNICIAN

Field technician–Must be experienced in systems: base stations consoles, microwave and data. PCIA or FCC certification preferred. Resume to:

Metropolitan Communications, Inc.
309 Commerce Drive, Exton, PA 19341
E-Mail: mcs@chesco.com
Fax (610) 524-9970

Motorola Two-Way Dealer

Help Wanted

Bench and Field Technician
&
Service Manager

D&R COMMUNICATIONS
Webster, MA
508-943-9595

DANGER!

Advertise in
MRT CLASSIFIEDS, or
get eaten by the competition!
Call 1-800-347-9375 today!

Use the Fast Fact Card for more information about a product or service.

Service Monitors For Sale

(4) Motorola R2200A	$2,500EACH
(1) Motorola R2001D	$5,500
(1) Motorola S1237B	$1,200
(1) IFR 1200S	$4,500
(1) Cushman CE15 Spectrum	$1,500

Maine Radio
800-456-4464

CMC ENTERPRISES 2-WAY, MICROWAVE & TELECOM EQPT.

Quantity	Equipment List	Price
	ALL TOWERS ARE ON THE GROUND READY FOR P/UP•OTHER SITES AVAIL.	
01	RHON USED 200' SSV BOTTOM SECTION 15 NH	$9000.00EA★
50	MOTOROLA SYNTOR XX (30-50 MHZ) SYS-90	$200.00EA★
10	MOTOROLA MICOR 800 TRUCKING 75W SOLID STATE PA REPEATERS	$900EA★
15	MOTOROLA SYNTORX 9000 UHF 110W VGC	$350.00EA★
20	MOTOROLA MARATRAC LO BAND 110W 42-50 MHZ	$250.00EA★
03	GE MASTR II REPEATERS HI BAND 110W	$1200.00EA★
50	MOTOROLA STARPLUS CHANNEL MODEMS MLN 6625	$225.00EA★
50	MOTOROLA STARPLUS CHANNEL MODEMS (TX) ORN 4535A	$125.00EA★
50	MOTOROLA STARPLUS CHANNEL MODEMS (RX) ORN 4537A	$125.00EA★
60	MOROROLA SIMULCAST REMOTE DELAY MODULES TRN9964A	$175.00EA
15	MOTOROLA SIMULCAST CONTROLLER INTERFACE MODULES	**CALL**★
	LOTS OF MOTOROLA, GRAINGER, LENKURT MULTIPLEX	**CALL**★
25	GE DELTA UHF SX 110W	$225.00EA★
15	GRAINGER LOW BAND 110W	$275.00EA★
15	GE RANGER UHF 110W	$275.00EA★
01	ROHN SSV TOWER 130' (BOTTOM SECTION #10N)	$4000.00EA★
01	ROHN SSV TOWER 140' (BOTTOM SECTION #10N)	4400.00EA★
01	ROHN SSV TOWER 160' (BOTTOM SECTION #12NH)	$6500.00EA★
01	GRASIS M 46 340' TOWER	$6500.00EA
01	ADVANCE INDUSTRIES 48" FACE 330' TOWER	$5500.00EA
01	ADVANCE INDUSTRIES 48" FACE 360' TOWER	$6000.00EA

★New Listing★ **Call Charles at 336-769-2885**
For more equipment, visit our website at **www.cmcent.com**

BUYING ERICSSON - GE EQUIPMENT

BUYING ERICSSON-GE EQUIPMENT	
LPE-200 800 EDAC From	650
PCS/MPA/LPE/KPC rapid multi-Chgr	295
MPA/MPJD std. desk charger	25
Monogram port. 36-42 new	100
11,000 Items new GE parts	Call
VHF/UHF/800 Voting aux rec.	250
S825 Scan head w/warranty	200
S990 128 ch head w/warranty	125
S950 128 ch head w/warranty	75
S550 Scan control head mint	195
Phoenix SX 16Ch VHF W/acc.	150
MLSH040/041- VHF MLS w/acc.	150
MLS 440-470 w/acc.	250
MLS 30-42/42-50 w/acc.	250
MLS-II 403-430 or 150-174 new radios less acc. & control pnl	50
MVS VHF & UHF w/acc.	250
KPC300 Ericsson VHF & UHF Port.	225
PCS UHF 2 CH Tech. specials	40
Rangr 150-174 110w less acc.	325
Rangr 30-42/35-50 100w less acc	325
Rangr 440-470 100w less acc.	325
Delta-S 450-470 less acc. 100w	250
Delta-SX 150-174 less acc. 100w	250
MASTR II 150-174 110w less ace.	125
MASTR II 42-50 110W	125

NEW LONDON TECHNOLOGY
752 Alum Springs Road • Forest, VA 24551
Tel: 434-525-0068 • Fax: 434-525-0078
www.newlondontech.com

BUY • SELL • TRADE • CLEAN EQUIPMENT

OVERSTOCKED! Must sell NOW -- Make an Offer.
See our website for 100s more items. • barnettelec.com • email bobb@flash.net
Min order $200 + shipping • VISA/MC, NO COD'S

Make Your Own Super Deal with Bob!

1	PURC 5000 VHF 350W	CALL	6	DIGITAL REMOTES L1887-1888, DGT-9000	$350
1	DESKTRAC BASE 100W 42-50 L/NEW TONE	MAKE OFFER	50	SYNTORX 9000 CABLES NEW HKW4221A	10/$750
30	155 WATT 800 MHZ PA DBP155CM2A-G WIDE BAND SOLD STATE	SALE $500	50	MITREK 60-100W 30-39 MHz / VHF150	FROM $100
40	SMARTNET TRUNKED SYSTEM CONTROLLER T5076 & others	SALE $1000	10	MIDLAND 70-050 42-50 MHz 60 W	$100
200	MICOR C55RCB5103 AT 800 MHZ REPEATERS 35,75 & 150 WATT	SALE $250	2	MIDLAND SR-70-0500C 42-50MHz 100W D/M NEW	$695
15	TPL 260 WATT PA B-266 HMS W/PS	SALE $350	1	MIDLAND XTR 70-1442 XTR 40 WATT VHF R/M NEW	$395
50	MICOR C73RTB1106E VHF 100W BASE/REPT	SALE $500	2	MIDLAND SR 70-2950 VHF 80 W W/PAC REPTR	$595
50	SYNTOR X CONSOLET & BASE 800T	SALE $150	1	MIDLAND XTR 70-1632B UHF 40W R/M NEW	$395
6	MSF 5000 UHF C74CLB 110W REPT	SALE $1995	50	SYNTOR X 9000 800 TRUNKED TYPE I/II & CONV.	SALE $150ea
30	GE 900 MHZ DIGITAL PAGING OR CONV REPT 60 WATT.	SALE $500	50	SYNTOR X 9000 UHF 32 CH W/ACC	SALE 4 / $1000
50	MICOR VHF-UHF, 30-50 MHZ BASE/REPT 100-375W		400	MOT PAC-RT REPT UHF/VHF	SALE $150
25	GE MASTR II BASE/REPT 30-50 MHZ, VHF, UHF		30	SYNTOR X 800 CONVENTIONAL 35W	SALE $50
40	CELWAVE SJD 880-5T, W/5CH MULTICOUPLER	SALE $750	10	SPECTRA 900 B7 15W	SALE $100
50	SPECTRATAC RECEIVER, VOTER NEW	$395	20	SYNTOR X 9000 CONVENTIOANL 35W 800 MHz	SALE $100
30	STX 800 TYPE I & II, PORTABLES	SALE $200	25	CENTRACOM II SYSTEMS, CARDS, PARTS & CABINETS	50%OFF
200	EXPO VHF PORTABLES W/CHARGER	SALE $50	100	T-1600 TONE 4 CH REMOTES	SALE $100
50	SABER-I UHF PORTABLE W/ CONVERTACOM	SALE $200	100	T-1383 TONE2 CH TEL REMOTES	SALE $50
4	MARATRAC 36-42 MHz 60W 2CH W/ACC	NEW $295			
200	MICOR VHF 100W 12CH W/ACC	4 / $200			
100	SYNTOR X VHF 100W 32CH W/ACC	SALE $100			
100	DELTA S VHF 100W 16/32 CH W/ACC	SALE $50			
200	MASTR E VHF 12 CH 100W W/ACC	SALE $50			
4	MLSL-260 60W 2 CH 42-50 MHz	$295			

BARNETT ELECTRONICS INC
330 HWY, 236 Lonoke, AR 72086 • Phone: 800-423-3858
FAX: 501-676-2475 • Info: 501-676-5506 • Hrs 8-5 M-F CDT

Comark DISTRIBUTING INC.
1-800-777-2708
"We've got what you need"

Antennas - Coax
Connectors - Batteries
Mounting Hardware
and More !

Gamber Johnson - Maxrad
Multiplier - Astron - JSC
RF Industries - A/S !

www.comarkdist.com - Business and government sales only

Employment

WIRELESS TECHNICIAN
Torrance, CA

The City of Torrance is seeking a self-motivated, detailed oriented professional to serve as Wireless Technician. Under general supervision, the Wireless Technician performs skilled work in the installation, maintenance and repair of mobile and stationary radios, public safety lights and sirens, voice intercoms and recording systems, and other electronic communications equipment. REQUIREMENTS: Four years of experience in installing, maintaining and repairing radio and electronic communications equipment; valid California driver's license; and a high school diploma. The monthly salary range is $3673 - $4460 plus a comprehensive benefits plan. Visit www.torrnet.com for details. **Submit your completed standard City application and supplemental questionnaire by Thursday, June 27, 2002 at 5:30 p.m. Call (310) 618-2969 or apply on line at www.torrnet.com.**

Computer Software

Find Solutions

To Your RF Coverage and Site Management Problems . . . On your own PC!

For either microwave links or area coverage, our Terrain Analysis Package (TAP)™ software helps you find system design solutions in-house.

See details and download demo from our web site!

SOFTWRIGHT, LLC
1010 So. Joliet St, Suite 204
Aurora, CO 80012-3150 USA
Tel. (303) 344-5486 • Fax (303) 344-2811
www.softwright.com
e-mail: sales@softwright.com

CIRCLE (102) ON FAST FACT CARD

Test Equipment - We Buy & Sell

Equipment Includes minimum: 180 Day Warr. & NIST Calibration

HP8920A/102,03,04,05 ~ $6900 — HP8920A/01,03,04,05 ~ $4900.
HP8921A ~ $7500. — HP8921A/600-CDMA ~ $8000.
HP892 IA/500-TDMA ~ $8500. — HP83204A (IS136-TDMA) ~ $2500.
HP89208~/102/4 ~ $7,500. — HP89208/01,04,06,13,14 ~ $5900
HP89208/01,04,06,13,14,50,102 ~ $7500., HP83206A(IS136-TDMA) ~ $800.
HP83236B(PCS) ~ $2500 — HP8922S GSM ~ $4500
HP8922P(GSM/PCS) ~ $8,900. — HP8922M ~ $6900.
HP8924C (CDMA) ~ $11,500. — HP8924E(CDMA) ~ $ 1000.
IFR CDM120A ~ $6500. — IFR500A ~ $3500
IFR1600S ~ $5900. — IFR 1600CSA ~ $6500
Motorola R2600C ~ $6900. — Motorola R2600B/HS $6500.
Motorola R2600B/HT ~ 5900 — Motorola R2009D ~ $4500.
Wavetek 3600D-IS136TDMA, FEX, ACELP, PCS~ $5,900
Wavetek 3600D-CDMA ~10,500 — Anritsu S332B ~ $6900
Spectrum Analyzers: HP8594E ~ $5900; IFR2398 (2.7Ghz) ~ $4500;
Tektronix 2784 (40 Ghz) ~ $9900; Anritsu Sitemaster S332B ~ $6900
1000Mhz Sig.Generators:
Fluke 6061A ~ $1600; Marconi 2022E ~ $1800; HP8657A ~ $2500.
2000 Mhz Sig. Generators Fluke 6082A - 100Khz-2.1 Ghz-$5900
HP53348 (1.3Ghz counter) ~ $375. — HP8903B Audio Analyzer $ 1800.
TIMS Sets: HP4935A ~ $950 ; HP4934A ~ $1250.
HP8902A Measurement Receiver (mint)-$8,900 ; HP8901B ~ $2400.

New Anritsu Sitemasters on Sale! ~ CALL!
Amtronix Instruments, Inc
www.amtronix.com
Ph: 716-763-9104; Fax: 716-763-0371

• BOARDS • STRIPS • ACCESSORIES • ELEMENTS • REEDS •

PCI — PEKAAR COMMUNICATION INC.
$ Specials of the month $ *Steve's back, formerly of Gregory Electronics Corp.*

GE MLS mobile model MLSL260 42-50 range w/ access ... $150
GE PCS multi unit charges model 344A3072P8 ... $50
GE Rangers 40 Watt high band 150-170 range less access. ... $35
GE ranger rack mount base station model 19A704647P1 less cabinet ... $250
GE MDS mobiles high band with access. Model TLH22 ... $80
GE MLS mobiles high band with mic & bracket ... $165
GE MLS UHF mobiles with mic. and bracket ... $155
GE S550 Scan control head ... $65
GE PHOENIX Mobile beige ... $98
GE PCS portable 150-170 range ... $99
Motorola portables HT 600 two freq. ... $125
REGENCY Mobile model BTH201 high band ... $20
MOTOROLA Micor 150-170 range, 100W range less accessories ... $50

Catalog Available...If you can't find it, try us! Call (973) 772-0704 or fax (973) 340-1902

• BUY • SELL • TRADE • BOARDS • STRIPS • ACCESSORIES • ELEMENTS • REEDS •

Call DAWN RHODEN for all of your CLASSIFIED advertising needs
1-800-347-9375

Rentals and Repair

Classified Advertising Works!

Minitor II Pager Repair Just $37.50
Price includes all Parts and Labor
5 Day turn time
90 Day Warranty
Dealer Price

800-822-2180
1300 N FL Mango Rd #21
West Palm Beach, FL 33409
Water/Physical Damage and housing parts not included

P&W Paging & Wireless Service Center

MOTOROLA
PORTABLE & MOBILE REPAIR

- Quick Turn Around
- FCC Licensed Techs
- Factory Trained Techs
- 90 Day Warranty on all Repairs

ARCOM
10117 W Oakland Park Blvd. Suite 321, Sunrise, FL 33351
800•567•5636
www.arcom2way.com

MOSS COMMUNICATIONS

MOTOROLA RADIO RENTALS

Ten years of great service to you!

Call for a quote. We'll make your next project affordable.

www.mosscom.com
800-822-MOSS

PRS $39 flat rate plus parts
MOTOROLA • PORTABLE & MOBILE REPAIR
FACTORY TRAINED & FCC LICENSED TECHS
FREE RETURN SHIPPING - QUICK TURN AROUND

PORTABLE RADIO SERVICE, LLC
209 KERA Dr. • Mtn. View, AR 72560
Voice: 800-245-4310
Fax: 870-269-5666
www.portableradioservice.com

MOTOROLA
RADIO RENTALS

- HT1000, GP300, P200
- Intrinsically Safe
- Full Line of Radio Accessories
- Mobiles & Repeaters
- 24-Hour Service
- Dealer Inquiries Invited

1-800-283-COMM
EVENT RENTAL COMM., INC.
e-mail: eventcomm@aol.com

Cardinal Electronics, Inc.

SERVICE MONITOR
Repair & Calibration
Exclusive Monitor repair since 1973
NIST TRACEABLE NEW LOWER RATES
Visit our Website: cardinalelec.com

1631 N. Evergreen Ave. Arlington Heights, IL 60004
Ph. (847) 797-7820 Fax (847)870-0342

Loudoun Communications Inc.
Communications Systems
REPAIR DEPOT

QUALITY SERVICE ON MICROPROCESSOR-BASED MOBILES, PORTABLES AND CONTROL HEADS.
SURFACE MOUNT REPAIR. MOST REPAIRS $75 PLUS PARTS.
FREE ESTIMATES.

Warranty Service Available On:
Com-Net Ericsson • Kenwood

585 Factory Shoals Rd.
Austell, GA. 30168 770-948-9566

WE BUY AND SELL USED **MOTOROLA** TWO-WAY RADIOS

SCHAEFER RADIO CO.
130 West Fayette St.,
P.O. Box 395
Denver, IA
50622

PHONE:
(319) 984-6115

FAX:
(319) 984-6220

QTY	
2	ea. PURC 5000 BASES, 900 MHZ, C85JLB1101A
8	ea. MICOR PURC BASES, 900 MHz, C75JZB1101A
3	ea. MICOR RPTRS, 800 MHz C55RCB5103AT
1	ea. TXRX 5 CHANNEL COMBINER, 800 MHz
2	ea. GTX 800 MHz, LTR M11UGD6CU1AN
10	ea. MAXTRAC, 800 MHz, D35MQA5G85AK
30	ea. RADIUS P200,490 MHz, H44RFU7120BN
1	ea. MSF 5000 RPTR, 460 MHz, C74CXB7106BT
14	ea. GR1225 RPTRS, 460 MHz, H5157A
7	ea. MICOR RPTRS, 460 MHz, C64RC83105
2	ea DESKTRAC BASES, 460 MHz, L545UM70D0B
14	ea SINCLAIR DUPLEXERS, 460 MHz, C3034-2F
90	ea. SYNTOR X 9000, 460 MHz, T34KEJ7J04AK
90	ea. SYNTOR X 9000, ACCESSORY GROUPS
12	ea. MAXTRAC, 460 MHz, D44MJA7JA5AK
12	ea. RADIUS M120, 460 MHz, M44GMC2DA3AA
99	ea. RADIUS GM300, 460 MHz, M34GMC29C3AA
6	ea. RADIUS M100, 460 MHz, D34LRA73A5BK
7	ea. MAXTRAC, 460 MHz, D34MJA73A5CK
2	ea. HT1000, 460 MHz, H01RDC9AA1DN
2	ea. MT1000, 460 MHz, H44GCU7100BN
32	ea. HT600, 460 MHz, H34SVU7160BN
12	ea. GP300, 460 MHz, P94YPC20A2AA
1	ea. MSR2000 BASE, 155 MHz, C73KSB1146B
1	ea. MICOR BASE, 155 MHz, C73RTB1106E
99	ea. SYNTOR X 9000,155 MHz, T73KEJ7J04AK
28	ea. MARATRAC, 155 MHz, T73XTA7DA3AK
10	ea. MITREK, 155 MHz, T83JJA3000
5	ea. MAXTRAC, 155 MHz, D43MJA7JA5AK
43	ea. MAXTRAC, 153 MHz, D43MJA77A3CK
2	ea. HT1000, 155 MHz, H01KDC9AA1DN
24	ea. MARATRAC, 48 MHz, T81XTA7DA3AK
99	ea. MITREK, 48 MHz, T81JJA4000
10	ea. MICOR BASE, 37 MHz, C71RTB1405
22	ea. MARATRAC, 37MHz, T81XTA7TA5BK
99	ea. MITREK 35 MHz, T81JJA4900DK
5	ea. DC DESK SETS, T1376
22	ea. LOCAL DESK SETS, T1370

WANTED: GP300 Portables, VHF/UHF SPECTRA Mobiles and UHF SYNTOR Mobiles

NATIONAL DISTRIBUTION CENTER

5520 North 1st street Abilene, Texas 79603

International Sales • Internet Specials

www.ndcsales.com

1-800-599-7235

USED 800 MHz EQUIPMENT 4 SALE

BUILDING OUT YOUR SYSTEM OVERSEAS?

WE STOCK IT ALL. USED CONTROLLERS, REPEATERS, RACKS, COMBINERS, POWER SUPPLIES, POWER AMPS, MULTICOUPLERS, PANEL ANTENNAS, SPARE BOARDS, MODEMS, SERVICE PARTS, ACCESSORIES, MOBILE ANTENNAS, MOUNT KITS AND MORE!

CHECK OUT THESE EXAMPLES

Motorola controllers in stock T1921A, T1958A, T3040A, T4052A
T5004A/Privacy Plus Super Enhanced Controller, 21 channel $15,000.00
MBX/Motorola Business Exchange, telephone interface $7,500.00
C65CLB-5103/MSF5000 75 watt repeater $2,500.00
C55RCB-5103/Micor 75 watt repeater – Reg. $500.00 ea. **Buy one at regular price get one free**
E.F. Johnson CR8000/800 MHz complete repeater in cabinet $500.00
MRS804ZX/800 MHz repeater with 90 watt PA $1,450.00
MRS804A/S/T/800 MHz standard trunking repeater $500.00
TKR900/800 MHz repeater with 90 watt PA $1,500.00
M-500/Trident smart buffer $250.00
RVL5200/Trident site controller $720.00
M101-860/5 channel combiner $500.00
ACT2705/Antenna Specialists 5 channel combiner $1,600.00
TX/RX T-Pass Cavity Combiner, 5 Channel $2,500.00
TWR-860/Telewave receive multicoupler $250.00

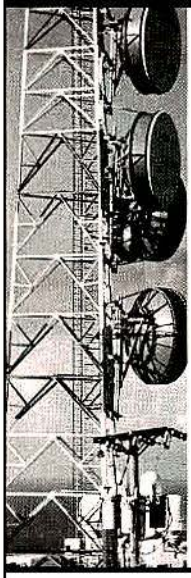
1000's of NEW PARTS AND ACCESSORIES IN STOCK!

- ✓ INVENTORY $PECIALS
- ✓ QUANTITY DISCOUNTS
- ✓ PAY BY CREDIT CARD!
- ✓ FREE QUOTES

U.S.A. CUSTOMERS MAY FAX TO: 1-800-599-7252
INTERNATIONAL CUSTOMERS CALL US AT 915-698-2481
OR FAX TO: 915-690-1309

Tower Services

TOWER



- *Fabrication*
- *Design*
- *Engineering*
- *Installation*
- *Service*
- *Maintenance*

Swager is your worldwide turnkey tower company.

Phone 1-800-968-5601 or Fax 1-800-882-3414

SWAGER Communications, Inc.

P.O. Box 656
501 East Swager Drive
Fremont, IN 46737 USA
Phone 1-800-968-5601 • 260-495-2515
Fax 1-800-882-3414 • 260-495-4205
E-mail: sales@swager.com
Internet: www.swager.com

CIRCLE (103) ON FAST FACT CARD

SUMMER SALE

- Minitor II Active Filters,1000's in stock
- Scan boards, Turn your Minitor II pager into a 2-channel scanner .. $48 installed
- Keynote channel monitor pager $85

CALL TOLL FREE 866-473-7257
or email bill@thepagerclinic.com

Licensing

FCC LICENSES AVAILABLE
Two-Way VHF (152/157)
Licenses Available. Exclusive use.
N. Illinois & Chicago
(847) 530-8238

HANDS FREE COMMUNICATIONS GEAR

NEXTEL®

iDEN / MIKE / SouthernLINC

"Our products incorporate a Patent-Pending PTT (Push-To-Talk) Button Technology that enables you to use the Direct-Connect "2-way" feature. Most control telephone functions as well."

All Products Manufactured by:

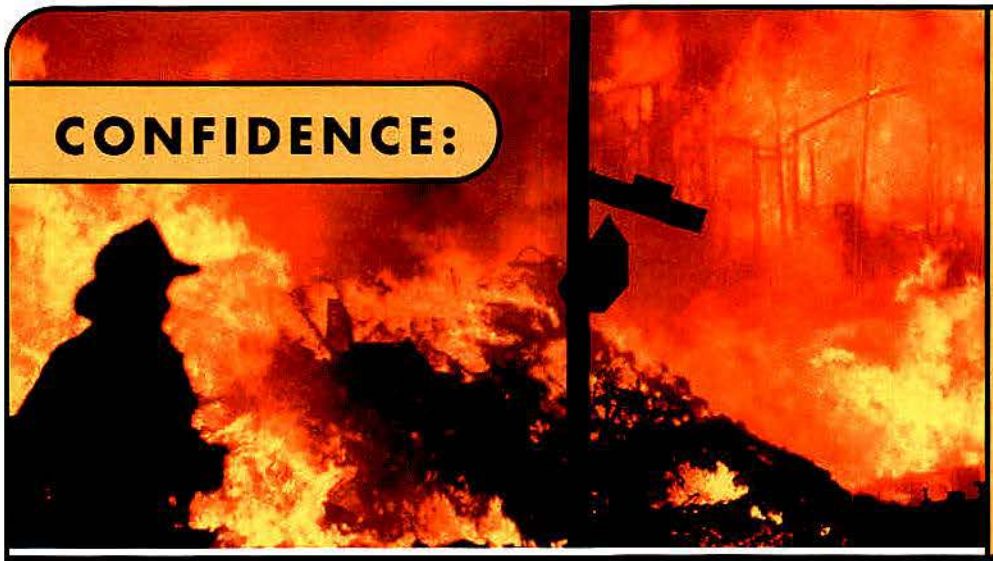
Klein electronics
"The Leader in Audio Accessories"

www.HeadsetUSA.com

1-800-959-2899

iDEN is the trademark property of Motorola
NEXTEL logo is the trademark property of NEXTEL COMMUNICATIONS, Inc.

CIRCLE (104) ON FAST FACT CARD



THE ASSURANCE THAT CRITICAL RESOURCES ARE AT HAND

Immediate response is critical. Outcomes are not predetermined, and you can't afford faulty mobile communications.

STI provides the system you need to automate radio signal measurements and analyze the results with contour plots and measurement summaries. You get concise reports identifying weak spots in signal coverage, so you can address problem areas before unreliability becomes a liability.

Confidence fuels success. Make sure your team has the critical communication coverage necessary to succeed.

STI Survey Technologies Incorporated

"Geographic Signal Coverage At Your Fingertips."

877-848-8500 toll-free
local: 503-848-8500 fax: 503-848-8534

www.surveytech.com
marketing@surveytech.com

8085 S.W. Nimbus Avenue • Beaverton, OR 97008

CIRCLE (105) ON FAST FACT CARD

Polaris Industries, Inc.
470 Armour Dr. NE Atlanta, GA 30324
Fax: 404.872.1038

Radio Programming Cables
Technical Information
404.872.0722

www.polarisradio.com

Cable	The Motorola ® Radio Each Cable Programs	Price
Model 1	HT 50 and the Radius P100 Models	$ 65.95
Model 2	HT600/800, MT1000, P200, P210, P500, MTX800/MTX810/ MTX820/ MTX888/MTX900	$ 69.95
Model 3	MARATRAC, SM10/SM50/SM120, GM300, GTX MOBILE, SPORTBASE, DESKTRAC	$ 59.95
	RADIUS – M100/M120/M130/M206/M208/M214/M216/M400/M860/MAXTRAC – 50/100/300/820/840	
Model 3B	MCS – 2000	$ 49.95
Model 4	STX, STX Gemini, STX 821 trunked portables, MX800	$ 49.95
Model 5	SABER and System SABER,SABER-R, MX1000/2000/3000	$ 99.95
Model 6A	SPECTRA Low and Medium Power Units	$ 59.95
Model 6B	SPECTRA 100 Watt and High Power Units	$ 59.95
Model 7	SYNTOR 9000 and 9000E Radio Line	$169.95
Model 9	R100 Repeater	$ 44.95
Model 10	MCX1000	$ 39.95
Model 11	Cloning Cable for the Motorola HT600/MT1000,P200	$ 59.95
Model 12A	GP88/280/300/350/600, LTS2000, GTX-Portable, P110, PTX600	$134.95
Model 13	MSF5000 Digital Unit with 3 Digit in Controller Tray	$ 35.95
Model 14	HT1000, MT20002100, MTS2000, MTXLS/838/8000, XTS3000/3500/5000, JT1000, PTX1200, MOF230 & JEDI Series	$125.95
Model 15	Visar Unit	$ 99.95
Model 16	Cloning Cable for HT1000, MT2000	$ 99.95
Model 17	ASTRO SABER and SABER SI	$ 99.95
Model 18	SP50, SP50+	$ 89.95
Model 19	M1225, GR300/400/500, LCS2000	$ 39.95
Model 20	P1225	$ 89.95
Model 21	HT750, HT 1250/HT1550, PRO5150/7150, GP318/320/328/338/340/360/380/640/680/1280, MTX8250	$ 99.95
Model 22	EX-500, EX-600	$129.95
Model 23	Cloning Cable for EX-500, EX-600	$144.95
Model 24	Ribless Cable for MTR-2000 Repeater	$ 49.95
Model 25	CDM-1250, CDM-1550	$ 59.95
PAC - 1	Mobile Charger/Power for PA –1/2/3	$ 24.95

800-308-5415

PA-I Programming Adaptor...$119.95
- Compatible with "RIB" Unit
- Rugged Steel Case
- Power LED

Note: Hardware Only
Software sold by Motorola

PA-II Programming Adaptor...$139.95
- Contains Rechargeable NI-CAD Batteries
- Perfect for Field Use and Portable
- Laptop/Notebook Computers
- Status LEDs: Power On and Data Transfer
- Power Switch
- Power/Charger Included
- Runs for 8 Continuous Hours from 1 Full Charge

PA-III Pocket Programmer...$169.95
- Micro-Size Design for Convenient Portability & Field Use (Laptops)
- Uses Surface Mount Technology
- Rechargeable Battery: Works Hours on 1 Full Charge!

CIRCLE (106) ON FAST FACT CARD

WE BUY AND SELL USED RADIOS

SIERRA TWO-WAY

916-344-3612 •OFFICE
916-344-1769 •FAX

Mobiles

D44MJA7JA5 - Moto Maxtrac 300 UHF 32 Ch 40w $275.00
D44MJA77A3 - Moto Maxtrac 100 UHF 6 Ch 40w $250.00
M11UGD6CB1 - Moto GTX 800 Mhz PP Type II 10 Ch 15w $150.00
D37MWA5GB7 - Moto Maxtrac 900 Mhz PP 30w, Conv $225.00
D35MWA5GB7 - Moto Maxtrac 800 Mhz PP 15w, Conv $125.00
D35MQA5GB5 - Moto Maxtrac 800 Mhz PP 15w, ... $75.00
SMS-825TS - Uniden 800 LTR 15w $125.00
T73KXJ7J04BK - Moto Syntor XX 9000 32Ch 100w VHF No/Acc .. $150.00
T45XAJ5G11AK - Moto Syntor 800 Mhz Type 1 45w All/Acc $75.00
D43CUA7D00AK - Moto MCX100 VHF 30w No/Acc $50.00
D45TLA5G00 - Moto Mostar 800 Mhz Type 1 ..... $25.00
T83RTA1200AA - Moto Micor 100w VHF Mobile $75.00
T73VBJD04BK - Moto Syntor XX 9000 complete kit siren package $600.00
T43UXA7H42AK - Moto MCX1000 VHF Trunk mount unit $150.00
TK-941 - Kenwood 900 Mhz LTR mobile 32 system 15w $225.00
TK-980 - Kenwood 800 Mhz LTR mobile 32 system 15w $125.00

Misc

633-6A-2N - Celwave Duplexer UHF $300.00
Model 5200 CES Interconnect Panel $275.00
Model 3500 CES Interconnect Panel $200.00
RELM Emergency repeaters 1 tone VHF $325.00
T800 TAIT TX/RX pair 72 Mhz $750.00
TWR8-150 Telewave Multicoupler 8Ch VHF $750.00
Zetron Model 37 Repeaterman $100.00
Zetron Model 48 Max interconnect panel $600.00
RELM Desktop UHF Repeater 45w 450-470 ..... $600.00
30-37-04 TX/RX Systems Duplexer $750.00
860 PMTS Terminal $75.00

E09DAL1000DR Moto Modax 500 ..... $100.00
PPL6050 Ef Johnson VHF Base w/power supply and desk mic . $125.00

Portables

P94MGC20A2AA - Moto GP350 UHF 2Ch 4w complete $325.00
P94YQT20A2AA - Moto SP50 UHF 2Ch 4w complete $250.00
P94YPC20A2AA - Moto GP300 UHF 2Ch 4w Complete $250.00
H01KDC9AA1 - Moto HT1000 VHF 2Ch 5w complete $350.00
H01RDC9AA1 - Moto HT1000 UHF 2Ch 4w complete $225.00
H01UCD6CB1 - Moto MTX8000 800 Mhz PP type I trunking .. $150.00
H11WCD6CU1 - Moto GTX 900 Mhz PP 10Ch 2.5w $200.00
H35JNC5170 - Moto STX 800 Mhz type I trunking $125.00
Moto HT90 VHF 2Ch 5w No/Acc $45.00
P23RRC20F2 - Moto SP10 VHF dip switch No/Acc $75.00
P9RMA - GE MPS 64Ch Scan UHF 5w No/Antennas $50.00
242-8100 - EF Johnson Viking 800 Mhz LTR complete $125.00
242-8150 - EF Johnson Avenger 800 Mhz LTR complete $125.00
Moto SP50 VHF 150-174 Mhz 10Ch 5w $225.00

Accessories

Moto STX/MX Rapid bank charger $50.00
NMN6193 Jedi Series lapel mics $40.00
L1261A Moto PP Local Remote $50.00
DR10 CPI Comm Remote $50.00
HLN1185B System 900 Siren Box $50.00
HSN4030 Moto 80HM Ext speakers (new) $30.00
HKN6103 Ignition sense cable kit $4.00
SL-11R Astron Power supply $75.00
SL-11 Duracomm Power supply $45.00

EQUIPMENT ARRIVING DAILY! FAX IN YOUR REQUEST!

sierratwoway@sierratwoway.com *www.sierratwoway.com*

CIRCLE (107) ON FAST FACT CARD

Pack Your Suitcase

June

16–20: NENA, sponsored by National Emergency Number Association, Indianapolis. **www.nena9-1-1.org.**

23–26: UTC Telecom, sponsored by the United Telecom Council, MGM Grand, Las Vegas. **www.utc.org.**

25–26: 16th Annual Police Security Expo, Atlantic City Convention Center, Atlantic City, NJ. **www.police-security.com.**

26: Region 40 700MHz Public Safety Regional Planning Meeting, 9 a.m., North Central Texas Council of Governments, Arlington, TX. Email: Peter Ungar, *UngarP@ci.fort-worth.tx.us.*

July

14–17: Forestry Conservation Communications Association National Conference, Radisson's Fort Magruger Hotel and Conference Center, Williamsburg, VA. **www.fcca.info.**

August

11–15: APCO Conference & Exposition, sponsored by the Association of Public-Safety Communications Officials–International, Opryland Hotel, Nashville, TN. **www.apcointl.org.**

September

17–18: C.O.P.S. West, produced by the California Peace Officers' Association, Ontario Convention Center, Ontario, CA. **www.copswest.com.**

October

5–9: 109th Annual IACP Conference: Law Enforcement Education Technical Exposition, Minneapolis. **www.theiacp.org.**

7–9: AMTEX 2002, Westin Fort Lauderdale hotel, Fort Lauderdale, FL. **www.amtausa.org.**

16–18: CTIA Wireless I.T. & Internet, sponsored by the Cellular Telecommunications & Internet Association, Sands Expo & Convention Center, Las Vegas. **wwwctiashow.com.**

November

5–6: Expo Comm Canada Communications, sponsored by the Canadian Wireless Telecommunications Association, Metro Toronto Convention Center, Toronto. **www.cwta.ca.**

6–9: Private Wireless Summit, sponsored by the Industrial Telecommunications Association, Marriott Wardman Park Hotel, Washington. 703-528-5115 or **www.ita-relay.com.**

13–17: Communications Marketing Conference, sponsored by the Communications Marketing Association, Wyndham Resort & Spa, Ft. Lauderdale, FL. **www.commktga.com.**

22: Radio Club of America Annual Awards Banquet and Technical Symposium, New York Athletic Club, New York. **www.radio-club-of-america.org.**

2003

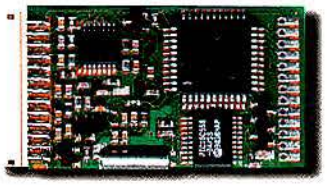
March

9–15: International Wireless Communications Expo, co-sponsored by *Mobile Radio Technology*, Las Vegas Convention Center, Las Vegas. **www.iwceexpo.com.**

30–April 2: Entelec, Austin Convention Center, Austin, TX. **www.entelec.org.**

Ad Index

Company	Page Number	Fast Fact Number	Advertiser Hotline
AC/DC Industries	34	100	281-933-0909
Anritsu Company	31	29	800-267-4878
APCO International	17	9	386-944-2456
Astron Corp.	19	18	949-458-7277
Avtec, Inc	25	22	803-892-2181
Berkeley Varitronics	11	10	908-548-3737
Comms. Specialists	BC	3	800-854-0547
Control Signal Corp.	30	28	800-521-2203
Cook's Communications	18	16	559-233-8818
CPI Communications	12	11	972-429-7160
Crescend Technologies	18	17	800-872-6233
Datron World Comm.	9	15	760-597-3814
Duracomm Corp.	32	31	816-472-5544
E.F. Johnson	27	25	800-328-3911
El Paso Communication	34	101	915-533-5119
Futurecom	29	27	905-860-5546
General Dynamics Decision Systems	13	12	877-449-0600
ICOM America	5	6	206-450-6041
IDA Corporation	26	23	701-280-1122
JPS Communications	24	21	919-790-1011
Klein Electronics	38	104	760-781-3232
Lattice Communications	20-21	19	972-496-7775
M/A-Com	1	4	434-385-2571
Midian Electronics	IBC	2	520-884-7981
Modular Communications	7	8	818-764-1333
Norcomm Corp	6	7	800-874-8663
Omnicron Electronics	32	30	860-928-0377
Polaris Industries	39	106	404-872-0722
Pryme Radio	28	26	714-257-0300
Sierra Two Way	39	107	916-344-3612
SoftWright	35	102	303-344-5486
Survey Technologies	38	105	503-848-8500
Swager Communications	37	103	800-968-5601
Telewave Inc	3	5	650-968-4400
Thunder Eagle	26	24	703-242-0122
Vega/Telex Signaling	16	14	402-467-5321
Vertex Standard	IFC	1	310-404-2700
W&W Manufacturing	23	20	800-221-0732
Zetron Inc.	15	13	425-820-6363



Rolling Code Scramblers

- High security - 1 trillion possible codes
- Superior audio quality
- Fleet management w/ CAD or DDU-300: ANI, Selcall, OTAR, & Deadbeat Disable

1200 Baud Data Modem

- Designed specifically for radio use
- Transparent or addressable modes
- Features data buffering & flow control

Speech Inversion Scramblers

- VPU-11: Factory programmable to any inversion code between 2000-4096 Hz
- VPU-12: 16-code version: 2200-4096 Hz
- VPU-15: 4-codes, ANI & encode/decode

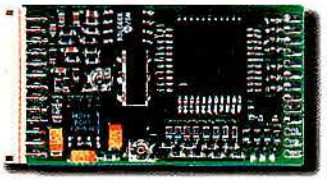
Repeater Maker

- Remote access/disconnect using DTMF
- Programmable hang time/time-out timer
- 2 selectable Morse IDs, CTCSS filter

We've Got It All!

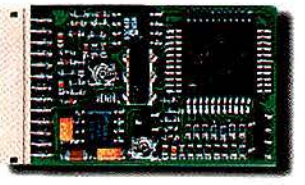
OEM Plug-In Products

- For Motorola, Icom, Maxon, Tait & Vertex
- We offer: Rolling code & inversion voice scramblers, ANI, & decoders



CTCSS/DCS Encoders/Decoders

- 38 CTCSS codes plus splits
- 106 DCS codes
- 64 memories (6-line binary)
- Available with ANI, TOT, & Penalty

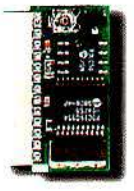


Universal Encoders/Decoders

- 2-tone, 5-tone, DTMF, &/or Pulse tone
- Features include ANI, selective calling, transpond, Deadbeat Disable, and more
- Microphone/dashmount versions available

Computer-Aided Dispatch

- MDC-1200®, DTMF, 5-tone, & GE-Star®
- Most models offer: aliasing, logging, spy, radio check, & Deadbeat Disable



Automatic Number Identifiers

- Available in MDC-1200®, GE-Star®, DTMF, 5-tone, & 2-tone
- Features time-out timer, emergency ANI, & leading &/or trailing ANI

Desktop Display Unit

- DDU Series: ANI Display Decoder with aliasing & last 10 ANI recall
- MDC-1200®, DTMF, 5-tone & GE-Star®

27 Years of Innovative, Quality Signaling & Scrambling Products

MIDIAN ELECTRONICS

ORDERS: 1-800-MIDIANS (643-4267)

2302 E 22nd St • Tucson, AZ 85713 • Ph: 520-884-7981 • Fax: 520-884-0422

E-mail: sales@midians.com • Web: www.midians.com

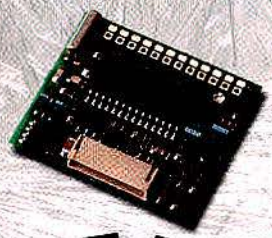
MDC-1200 is a registered trademark of Motorola C & E, GE-Star is a registered trademark of GE/Ericsson

CIRCLE (2) ON FAST FACT CARD

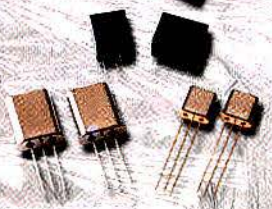
COMMUNICATIONS SPECIALISTS, INC.

LEADING THE WORLD IN ADD-ON TONE SIGNALING PRODUCTS FOR OVER 30 YEARS

- One Year Warranty on all products
- Order Factory Direct – No Minimums
- Same day shipping on most orders
- Toll free voice and fax for easy ordering
- 24 hour "InfoFax" and website application notes for around-the-clock tech support



DCS-23
Digital Coded Squelch Encoder-Decoder
Jumper Programmable to all 106 DCS codes.
1.36" x 1.18" x 0.25"
$59.95



FILTERS
Call us for the lowest cost, 12.5kHz channel spacing, exact replacement crystal and ceramic IF filters for part 90 Refarming. Complete kits available for most popular radios at $15.00 to $25.00/kit.

ID-8
Automatic Morse Station Identifier
Meets all FCC ID requirements.
Fully field programmable with included keypad.
1.85" x 1.12" x .35"
$69.95

PE-1000
Desktop Paging Encoder
Two-Tone Sequential.
Other formats and custom tones available.
7.5" x 7.8" x 2.7"
$224.95

SS-64
CTCSS Encoder
Microminiature, DIP switch programmable.
Includes 64 tones from 33.0 to 254.1 Hz.
0.66" x 1.08" x 0.21"
$28.95

TE-32
Multi-tone CTCSS Encoder
Rotary dial switchable to any of the standard 32 EIA tones.
5.25" x 3.3" x 1.7"
$49.94
TE-32D with LED display, $99.95

TP-3200
Shared Repeater Tone Panel
Full featured and with all 157 CTCSS/DCS codes.
Desktop and rack mounted versions.
$279.95

TS-64
CTCSS Encoder-Decoder
Microminiature jumper programmable.
Includes 64 tones from 33.0 to 254.1 Hz.
0.78" x 1.70" x 0.25"
$54.95 (model TS-64DS with DIP switch, $57.95)

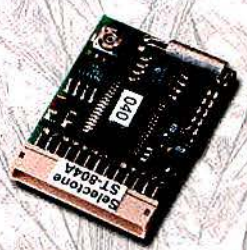
NOW MORE THAN EVER, YOUR BEST SOURCE FOR QUALITY TONE SIGNALING PRODUCTS!

WE'RE PLEASED TO ANNOUNCE THE ACQUISITION OF THE

Selectone

LINE OF TONE SIGNALING AND ENCRYPTION PRODUCTS, TO BETTER FULFILL YOUR TONE SIGNALING REQUIREMENTS.

ST-20, 25, 50
Voice Encryption Units
PRIVATE COLLECTION™ series provides low to high level security for two-way radio voice applications.
PC programmable with optional kit.
0.9" x 1.5" x 0.25"
$79.00 - $299.00



ST-804A
Multi Format Encoder
Encodes Two-Tone Sequential, Burst Tone, or DTMF ANI/ENI Formats.
PC programmable with optional kit, or factory programmed for free.
1.15" x 0.84 x 0.15"
$59.95

ST-809B
Multi Output DTMF Decoder
Decodes address codes of 1 to 7 digits from all 16 DTMF characters.
Multiple outputs and remote reset capability.
PC programmable with optional kit, or factory programmable for free.
1.34" x 0.85" x 0.21"
$59.95

ST-888
Desktop ANI Decoder / Display Unit
Use with ST-804A or other DTMF ANI encoders for monitoring of fleet radio users and control systems.
$499.00

COMMUNICATIONS SPECIALISTS, INC.
426 WEST TAFT AVENUE • ORANGE, CA 92865-4296
(714) 998-3021 • FAX (714) 974-3420
ENTIRE U.S.A. (800) 854-0547 • FAX (800) 850-0547
http://www.com-spec.com

CIRCLE (3) ON FAST FACT CARD